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VOLUME XV NEW YORK, JULY 26, 1926 No. 12

How to Obtain English Patents for Textile Inventions

Provisional Protection—Drawings—Methods of Filing Documents—First Official Examination—Complete Specification—Second Official Examination—Sealing Fee

By CHARLES E. VAGG, A.M.I.R.E.

British Patent Expert

THE textile industry still presents a great field for inventions, and in order that inventors may reap a benefit and reward for their discoveries, patent protection should be obtained in the principal countries dealing with this class of industry.

England should be included in the list and in this article the requirements for English patent applications will be discussed. Let us consider first of all what can be patented in England. Any new art, method of manufacture or particular composition of known matter, or in fact any new combination of known things which produce a result which is of some advantage. In short, any new process of improvement on existing processes or manufactures would form suitable subject matter for an application for letters patent.

Inventions which are of most value to the inventor from a financial aspect are those that do not involve heavy capital expenditure in marketing them, since manufacturers are more inclined to give such inventions a trial in preference to those requiring a great initial outlay.

Provisional Protection

Provisional protection can be obtained in England to cover an invention for nine months, but it should be clearly understood that this protection does not constitute a patent, and while it protects the inventor inasmuch as he may publish details of his invention without prejudicing his right to a full and complete patent dating from the date of his original provisional protection—in other words, from the date of his first filing a description of his invention at the patent office—he cannot, however, take any action against infringers under this provisional protection. When his full patent is sealed, he can obtain damages for infringements made at any time after the acceptance of his complete specification which must be filed during the nine months provisional protection term, or this period can be extended by the payment of an official fee of £2 to ten months.

It is clearly laid down that the invention must be *new*, and therefore the applicant for a patent must be prepared to declare that to the best of his knowledge and belief, he is the true and first inventor.

He must prepare a specification in the English language, describing his invention sufficiently clear so that an artisan, skilled in the textile industry, can carry out the invention from the information given in the specification. This description should be written or preferably typewritten on one side only of foolscap paper, leaving a margin of about two inches on the left-hand side thereof. If the invention is of such a nature that it can be better described by the aid of drawings, these may accompany the specification, and in this case they should be specifically referred to in the description.

Drawings

Great care should be taken in the preparation of the drawings which must be made on pure white strong paper of smooth surface, best quality and medium thickness. No washes or colors are allowed to be used, and it should be remembered that these drawings have to be clearly reproduced after being reduced by photography, and since this process does not give good results if the paper used is not of the best quality and the draughtsmanship of the highest order, too much care cannot be spent in their preparation. The paper should measure 13 inches from top to bottom and either 8 inches or 16 inches wide, the narrower sheets being preferable and any number of sheets may be used provided a clear margin is left half an inch from the edges. The following point should be kept in mind:

(a) Black ink must be used.

(b) Each line must be firmly and evenly drawn, sharply defined and of the same thickness throughout.

(c) Shading lines, section lines and lines for effect should be as few as possible, and in order to

allow for reduction in scale, must not be closely drawn.

(d) If shading lines are used they must not contrast in thickness to any great extent with the general lines of the drawing.

(e) In no circumstances should sections and shading be represented by solid black.

(f) A sufficiently large scale should be used to show the invention clearly, and in the case of large apparatus or machines only that part of the installation should be shown that affect the invention, and no dimensions should be marked on the drawings.

(g) The figures of the drawing should be arranged in an upright position in relation to the top and bottom of the paper; that is to say, the figures should appear in their natural position when the sheet is placed with the 13 inches measurement at the sides, and the 8 inches or 16 inches at the top and bottom, the reference letters being correspondingly placed.

(h) The reference letters and numerals must be bold, distinct and not less than one-eighth of an inch in height, preferably larger. All parts should be marked with reference letters if they are to be referred to in the specification, and the same letters should be used to denote the same parts in different views of the apparatus. Fine lines may be used to connect the reference letters with the parts referred to.

The name of the applicant must appear on the drawings in the left-hand top corner, and the number of sheets together with the consecutive number of each sheet in the right-hand top corner. No descriptive matter must appear on the drawings, but they should be signed by the applicant in the right-hand bottom corner. In addition to an "original" drawing a facsimile or "true copy" thereof must be filed at the same time as the original, and these should be prepared strictly in accordance with the requirements set out above for "original" drawings, except that, in this case the reference letters or numerals and leading lines must be in black ink but should be inserted with black lead pencil. If the "true copy" is made by hand, tracing cloth may be used for this purpose, but if a lithographic process is used to produce them, then similar paper as for the "original" should be used and the words "original" or "true copy" must in each instance be marked under the numbering of the sheets at the right-hand top corner.

Method of Filing Documents

Assuming that the preparation of the specification and drawings has been satisfactorily carried out, it only remains to get them on file in the English patent office, and since it is necessary to have an address for service in England, duplicate copies of the specification and drawings, together with a Patents Form No. 1 signed by the applicant, should be sent to a patent agent in England requesting him to file the case in question. The agent will stamp the Patents Form No. 1 with a £1 stamp when filing the documents and will charge a small fee for his services.

The First Official Examination

Upon receipt of the documents by the Patent Office they are passed to an examiner, who reports to the comptroller whether the invention has been fully described, whether the title chosen by the applicant is sufficiently clear to indicate the subject-matter of the invention and lastly whether more than one invention is described in the specification.

Should the examiner report unfavorably upon any of these items, the comptroller will return the incorrect documents and request the applicant to amend them before he proceeds with the application. In the official letter which accompanies the returned documents it is clearly set out what the objections are and in most cases suitable amendments are suggested. The applicant will be well advised to follow out these suggestions provided, of course, that by so doing he does not limit the scope of his invention unduly. The amendments made should be initialed by the applicant and the documents returned to the Patent Office, when a further examination will take place and if the application is now considered to be in order, the specification is accepted and provisional protection is granted from the date of the filing of the documents in the first instance. An official acceptance notice is sent to the applicant and the documents filed in connection with the provisional protection are kept secret by the Patent Office.

The Complete Specification

During the nine months following the date of the provisional protection, it is necessary to file a complete specification if it is desired to secure a full Letters Patent to cover the invention. Should the applicant, however, be unable to file this document during the prescribed nine months, he can obtain one month's extension for this purpose, at a payment of an extension fee of £2 which should be made on Patents Form No. 6, but it should be noted that no further extension after ten months can be obtained, and if the complete specification is not filed during that time the application is deemed to be abandoned.

The complete specification must describe the invention much more fully than the provisional, details must be gone fully into and the best method known to the inventor of carrying out the invention must be accurately detailed and the particular novel parts of the invention must be clearly and specifically claimed at the end of the specification. If any parts of the apparatus forming the invention are old, it must be clearly acknowledged and dis-

tinguished from the parts of the apparatus that are new and really form the invention. In this respect it would be as well to remember that although an applicant may succeed in getting a claim accepted by the Patent Office which covers something that is already known, and perhaps in use, this claim would be of no value, and if litigated, would be declared invalid.

The drawings filed with the provisional specification may be used for the complete in which case they must be referred to as "the drawings accompanying the provisional specification," in the description or if no drawings were filed with the provisional, then they must be prepared in accordance with the instructions mentioned earlier in this article.

The complete specification must be commenced on Patents Form No. 3 which must be stamped in the same way as the Patents Form No. 1, but in this case with a £3 stamp. The specification can be continued on sheets of foolscap conforming to the same requirements as those laid down for the provisional specification, and must be sent in duplicate together with the drawings also in duplicate to the Patent Office as before.

The Second Official Examination

It is possible to file the complete specification in the first instance, instead of the provisional, in which case it must be accompanied by Patents Form No. 1 as in the case of filing a provisional specification. Whichever procedure is adopted, the complete specification, when filed, is sent to an official who is instructed to examine the document to see if the invention has been described wholly or in part in any prior English patent specification published during the preceding fifty years. Should the examiner find any patents which are similar to the applicant's invention but prior to it he will cite these and the applicant will have the option of amending his specification so as to steer clear of the inventions described in the prior specifications, in which case the documents are then examined and if necessary again objected to and a further opportunity given for amendment. Alternatively the applicant may agree to the insertion of a reference by number to the prior specifications in his own by way of notice to the public. Should there be in the opinion of the examiner more than one invention claimed in the specification, the applicant must restrict his specification and claims to one invention only with the option of filing a further application or applications to cover the subject-matter of the divided inventions and these applications will if desired carry the date of the original application.

Should the applicant not agree with the examiner's views, however, he may appeal against them to the hearing officer who is usually the assistant comptroller, in which case an opportunity will be given the applicant, or his agent, to discuss the matter personally with the hearing officer, and even from his decision an appeal may be made to the law officer. The official examination is, of course, not an absolutely complete one since it is only through English specifications of the last fifty years that the examiner searches and not as in the United States and Germany where the search is made also through foreign patent specifications and technical publications.

Sealing Fee

If after amendment the examiner is satisfied that all the objections can be met and the documents are in order, an official acceptance notice will be sent to the applicant, and the documents are then laid open for public inspection for a period of two months during which time any interested party who has cause to do so may oppose the grant of letters patent if they can furnish proof that the inventor is not the true and first inventor, or alternatively the invention was known before the date of the application, etc., etc.

It is not often, however, that oppositions are lodged, and usually the specification and drawings are printed after the expiration of the two months' period and on payment of the sealing fee of £1, and copies can be purchased at the sales branch of the Patent Office, 25, Southampton Buildings, London, W. C. 2, England, for the sum of one shilling per copy.

NEW DYE RESTRICTIONS IN JAPAN

The Japanese Government has placed kinolin yellow and saffranine under an import ban. A Dyestuffs Aid law was enforced in October, 1925, under which the Nippon Dyestuff Corporation, the Miike Company and the Yura Company were offered 4 million yen in payments extending over six years, to produce twenty different kinds of dyes.

The Nippon Dyestuff Company is now in a position to turn out these two dyes, for which the Japanese Government will pay 35,000 yen in subsidy for 1925-1926, at the same time prohibiting their import from Germany. The company may receive 200,000 yen in aid on them up to September, 1926. There are seven dyes added to the list of those that can be manufactured in Japan.

As to the liquidation movement in the Nippon Dyestuff Company, the Japanese press says that the problem is complicated by factions in the company. There are three parties striving for supremacy in the management. One stands for the continuation of business, another for liquidation or retrenchment, and the last which advocates winding up in order to get the reserve distributed among the shareholders, a large proportion of whom it represents. The group which urges liquidation or retrenchment has formed a plan to reduce the capital. Members propose that the reserve of more than 2 million yen be employed to buy shares of the company on offer on the basis of 35 yen per share, and that the amount these shares represent be written off the capital.

The Constitution of Wool

A Discussion of the Constitution of Wool, Its Relation to Fur, Hair and Silk, and a Review of the Recent Work Upon the Proteins Constituting Wool

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AFTER our consideration of the proteins in general, and the amino acids, as well as their compounds, it is only logical to make a more detailed study of the literature regarding the protein, or rather the complex mixture of more or less closely related proteins in which we are particularly interested, i. e., keratin or wool. It is unfortunate that many textile men, even chemists and dyers, appear to consider wool as a substance which does not enter into chemical reactions, but which is "injured" by various chemical and physical processes. If we merely remember that wool is a protein, or more correctly, a mixture of more or less closely related proteins, and then apply to wool our knowledge of the reactions of the amino acids and proteins in general, we certainly have a much better understanding of the subject as a whole.

The constitution of wool is frequently covered by the one word, keratin, which is defined as an albuminoid protein containing sulphur. With our present knowledge of the proteins, it is fairly safe to assume that keratin, or the keratins, as the case may be, consist of at least ten or more amino acids. At least these compounds are present in its hydrolytic products, no matter how the decomposition is accomplished. Reference to Table No. III* indicates how the proportions of these acids are reported to vary in keratins from various sources, as well as in other proteins. The total amount of these amino acids is far less than 100 per cent, but at present we know and are able to isolate only about seventeen amino acids. Possibly there are more which we will be able to identify later, thereby increasing the total.

Considerable work has been done upon the constitution of the keratins at various times by different workers, but many of them have arrived at the conclusion that wool, fur, hair, feathers, nails and horn have the same constitution. While silk resembles these in chemical constitution, it is entirely different in physical structure, in that it is not cellular and consists of fibroin (fiber) and sericin (gum). Wool, fur and hair are cellular in structure.

Very probably this difference in physical structure of wool and silk is due to their widely different methods of origin. Wool is a cellular growth from a root in the skin, and very probably increases or grows by the development of the individual cell about a nucleus, possibly in the medulla and perhaps mostly in or near the root. Silk, on the other hand, is formed from a glanular exudate of the silkworm, and is not the product of cellular growth, as is the animal body itself and all its appendages, including hair, fur, wool, nails, hoofs and horns.

Wool, Fur and Hair

From our consideration of the constitution of the various keratin fibers, i. e., wool, hair and fur, we have seen that they are rather closely related in chemical composition. While they are all classed as keratin, very possibly they may differ more widely in their constitution than is ordinarily realized. For instance, U. Sammartino, *Biochem. Zeits. 133,* 476-86 (1922), found that the cystine content or keratin varies according to the source of the keratin, such as from hair, nails, etc., the other amino acids varying to a smaller extent. However, any dyer of furs will readily testify as to widely different dyeing properties of wool and furs. Whether this is all due to a difference in the physical structure of the fiber, or to varying proportions of the different constituent proteins, remains to be shown.

Dr. Bowman, in The Wool Fiber, states that "the difference between wool and hair is one rather of *degree* than *kind,* and all wool-bearing animals have the tendency, when their cultivation is neglected, to produce hair rather than wool. Wool and hair, fur being intermediate, are simply modifications of the same root-substance, and the scales of the wool fiber have a much larger free margin than is the case with hair, being only attached to the stem for about one-third of their length, and in many cases the free ends are more or less turned upward so as to present a much more serrated edge than is the case with hair. The interior portion of the fiber, however, does not differ in the least from that of hair, and can neither be distinguished from it chemically nor microscopically."

While all this may be, and very probably is true, it is also possible that certain changes may slowly take place between or in the amino acids on proteins

*American Dyestuff Reporter, June 28, page 416.

which constitute the wool, as it becomes more hair-like in its properties. Perhaps our present knowledge of the proteins is not sufficient to enable us to detect these changes. It is well known, as will be pointed out later, that even the two ends of the same wool fiber do not dye exactly alike under the same conditions. Many reasons, such as the action of weather, light, etc., have been advanced to explain this difference in the properties of two proteins of the same fiber, but it is also possible that it is due to a gradual change in the fiber constitution with age.

When we consider the large number of possible combinations and variations within the protein molecule, it becomes very plausible that most of our natural proteins, such as wool, silk, gelatin, collagen, consist of a mixture of very complex and similar proteins. Possibly all of these present in a single protein, as we to-day know it, belong to the same class and are closely related both as to properties and constitution. The fact that there is an "isoelectric range" for most natural proteins, rather than an "isoelectric point," indicates that they consist of a mixture of closely related compounds rather than a single definite compound.

Dr. Chas. S. Hollander, of the Rohm & Hass Company, who has made a very extensive study of the proteins, very aptly compares the proteins, such as wool and gelatin, in view of our present knowledge, to the rare metals group. The rare metals are more or less difficult to separate completely, with our present limited knowledge, and when taken together frequently appear to act as a single element in a reaction. In other words, they might readily be and at one time were, mistaken for a single chemical substance. In the same manner our present proteins, which many writers appear to consider as a single compound, may and very possibly do consist of a far larger number of related and more or less similar compounds.

Knaggs and Schryver, *Biochem. J. 18,* 1095-1101 (1924), state that even the purest gelatin does not behave as a chemical entity, and may readily be separated into three fractions.

X-Ray Examination of Wool and Silk

The use of X-rays in the examination of various substances, including what were formerly regarded as amorphous materials, has developed the fact that crystals exist where they are least suspected, thus somewhat altering some of the older ideas regarding the physical constitution of all our textile fibers. A paper by Herzog and Jancke, *Umschau 25,* 53-4 (1921), on the "Molecular Structure of Fbrous Materials," states that animal hair is amorphous, and probably consists of two or more substances. Natural silk shows a crystalline character and a symmetrical structure similar to that of cellulose. R. Brill, *Ann. 434,* 204-17 (1923), states that from an X-ray study of the fibroin of silk, it appears that this "protein" is a mixture of at least two proteins, one of which is crystalline. The crystals appeared in each of the nine varieties of silk (fibroin) examined.

Herzog and Gonnell, *Ber. 58 B,* 2228-30 (1925), report that an X-ray examination of collagen crystals indicates a molecular weight of 685 and for this reason it cannot contain all thirteen of the amino acids found in gelatin. They therefore state that most of the amino acids appear to be present as amorphous impurities, which is also indicated by the cloudiness of the collagen crystals. It is possible that the heavy aggregates that have heretofore been called "molecules" of such proteins as collagen are really colloidal aggregates of true molecules of comparatively low molecular weight. While H. and G. do not report upon keratin, their remarks may apply with equal force to this closely related protein, and is further evidence indicating that it is undoubtedly a mixture and not a true single compound.

"Lanuginic Acid"

Champion, *Comptes Rendus 72,* 330 (1871), was one of the first to investigate the composition of wool, and reported a decomposition product which he called "lanuginic acid," giving it the formula $C_{38}H_{60}N_{10}O_{20}$, entirely omitting the sulphur present.

Knecht and Appleyard, *J. Soc. Dyers and Colourists 5,* 71-8 (1889), prepared the so-called lanuginic acid of Champion by decomposing wool with barium hydrate and purifying by means of the lead salt of this acid. The resulting "lanuginic acid" was slowly soluble in cold water, easily soluble in hot water and sparingly soluble in alcohol, but insoluble in ether. The aqueous solution of this acid under suitable conditions precipitated both acid or basic dyes, giving colored lakes, as well as tannin and various metallic mordants. Knecht reported this product to contain 41.61 per cent of carbon, 7.31 per cent of hydrogen, 16.26 per cent of nitrogen, 3.35 per cent of sulphur and 31.44 per cent of oxygen. Undoubtedly the lanuginic acid was a mixture of the various hydrolytic products of wool, varying in composition, and therefore in its properties, according to the exact method and procedure of decomposition. Also see Knecht, *J. Soc. Dyers and Colourists 4,* 106-7 (1888).

Knecht had previously expressed the opinion, *J. Soc. Dyers and Colourists 4,* 104 (1888), that investigation of the constitution of wool would lead to the fact that wool, like other organized substances, consists of a number of distinct substances. He possibly had in mind the fact that nature seldom or almost never produces pure compounds, especially in organized matter.

K. Gebhard, *Zeit. angew. Chem. 27,* 297-307 (1914), working along this line, dissolved wool in warm dilute soda solution, and, upon rendering the solution just acid, obtained a greenish-white amorphous precipitate and a brown colloidal solution. By oxidation, the former quickly turned a dirty yellow color upon exposure to the air. Gebhard suggests that this may be identical with the lanuginic acid of Knecht and Appleyard. It has a strong affinity for both acid and basic dyes. The material re-

maining in solution, which is small in amount, is precipitated by sulphuric acid and has only a slight affinity for dyestuffs. While this work only suggests two decomposition products of different types, it also points to at least two types of constituents in the original wool.

Various other writers have suggested that wool may not consist of a single homogenous chemical compound. Dr. J. M. Matthews, *Color Trade Jour. 14,* 7 (1924), expressed the opinion that wool is not a simple substance, but is no doubt composed of cells of different varieties of a complexity inherent to cells of living tissue. It is probably composed of a rather various aggregate of a number of substances, instead of being a simple and single chemical compound, each one having its own particular constitution and chemical and physical properties. He further says that as we get away from the idea that the wool fiber is a unified and uniform product in a chemical sense, we will be better able to discuss the dyeing problems of wool in an unprejudiced and open-minded fashion.

Trotman, Trotman and Sutton, *J. Soc. Chem. Ind. 45,* 20-4 T (1926), say that "the assumption that wool consists entirely of one homogenous substance, namely, keratin, has always seemed unwarranted, since it must be borne in mind that there are at least two distinct types of tissue in wool while it is on the sheep; these are the living cortex and the dead epithelial scales. It seems only natural that there should be a difference between the composition of the two tissues." Their experiments indicate that there are at least two, and very probably three or more, more or less distinct proteins in wool. Whether the two proteins studied by them have a separate existence in the fiber or whether they are metaproteins—i. e., cleavage products of a more complex protein—they have not finally determined. The evidence indicates that the one exists principally in the cortex, while the other is found mainly in the epithelial scales.

We are all familiar with the physical structure of wool. The inner medulla or marrow with a structure resembling the pith of a plant stem, and consisting of innumerable cells with air spaces and pigment; the surrounding layer of more fibrous cellular material, which consists of many elongated cells with some particles of pigment, which is called the cortical layer, and held in place by the horny and scale-like flattened cells of the surface (epithelium).

As the present papers are more chemical than physical, and as this phase of the subject has been covered repeatedly, it is needless to discuss it further here. There is one point here, however, which has not been particularly developed in the literature. Under the microscope, most living cells are more or less rounded in shape, as are also the cells within the medulla and root of wool or hair. Above the surface of the skin, as the external surface of the fiber is approached, the cortical cells are somewhat more flattened or compressed, longer and more spindle shaped, while the external or epithelial cells (usually called scales) are decidedly flat, with a hardened and scale-like character and appearance. This is very clearly shown by W. Smith, *J. Soc. Dyers and Colourists 5,* 12 (1889). Very probably these more compressed or flattened cells contain much less water than those of the interior portion of the fiber.

It is possible that when first formed in the root or in the medulla of the wool fiber, the rounded cells may all have the same, but highly complex constitution, and that each cell contains practically everything found in the wool later, but perhaps in a different form or combination. As the hair grows and the cells become older, it is possible that the protein in these cells, and undoubtedly there are a variety of them, as well as any other constitutents present, gradually change in chemical structure or constitution, just as the external shape of the cell itself gradually changes, becoming flatter and more scale-like. The living cell usually contains from 70 to 90 per cent of water. Wool normally contains less than 18 per cent of moisture, yet these cells were once living. They must have changed considerably in chemical constitution while being dehydrated. It is thus possible that the different proteins isolated from wool may have been all originally the one material and are just various stages in the transformation from the original rounded living cell, to the scale-like external or epithelial cell of the wool.

It is interesting to note here that a recent publication by Barker and King, Publication No. 53, of the British Research Association for the Woolen and Worsted Industries, states that comparative measurements of wool by means of the micro-balance and projecting picroscope, show that the medulla of wool contains about 90 per cent of air space. For this reason the calculated diameters of medullated or kempy wool fibers are less than the observed diameter, the difference increasing with the increase of medulla content. The calculated and observed diameters of non-medullated wools show good agreement. K. Klink, *Biochem. Z. 160,* 28-42 (1925), found 5.4 per cent of oxygen and 2 per cent of carbon dioxide in the gas present in the hollow cylinders of curly hair.

Three Proteins of Wool

From their experiments upon the action of acids and alkalies upon wool, Trotman, Trotman and Sutton, *loc. cit.,* thought that keratin might consist of two or more proteins or metaproteins, one of which is comparatively resistant to the action of acids and the other to the action of alkalies, and which may differ also in the percentage of sulphur and firmness with which it is retained under the action of chemical reagents.

Working along this theory, they treated wool with concentrated hydrochloric acid at 70 deg. Cent. (157 deg. Fahr.) until only a structureless residue remained which dissolved only very slowly. This was filtered off and washed. Upon cooling the filtrate the neutralizing with sodium hydroxide to pH 4 to 5, a copious precipitate was obtained, which upon further purifica-

tion, gave all the proteins reactions, was insoluble in water, but dissolved in alkalies or strong acids. It contained 0.4 per cent of ash, 3.62 per cent of sulphur, and 12.5 per cent of nitrogen. This was designated Protein A.

After the removal of Protein A the filtrate was nearly neutralized and saturated with magnesium sulphate. A small quantity of a gummy precipitate was obtained which was readily soluble in cold water, and when further purified contained 1.12 per cent of ash, 4.05 to 4.1 per cent of sulphur, and 14.57 per cent of nitrogen. We might designate this Protein X for convenience.

The structureless residue, remaining from the original action of the hydrochloric acid upon the wool, was dissolved in dilute ammonia and upon purification proved to be a protein containing 0.10 per cent of ash, 1.49 per cent of sulphur and 12.68 per cent of nitrogen. This was designated Protein B.

Upon treating wool with cold concentrated hydrochloric acid for forty-eight hours, filtering, neutralizing and purifying, a similar protein containing 1.4 per cent of sulphur was obtained. The undissolved portion of the wool appeared to consist chiefly of epithelial scales, and upon washing, drying, etc., contained 3.67 per cent of sulphur which agrees very well with the Protein A above. This appears to indicate that Protein B is present mainly in the cortex, while Protein A is more abundant in the epithelial scales of the wool.

Upon treating a fresh portion of wool with warm normal sodium hydroxide solution until most of it was dissolved, cooling and filtering the solution, then neutralizing and purifying the precipitated protein, a product resembling Protein B was obtained which first contained 1.5 per cent of sulphur and on further purification, 1.39 per cent of sulphur. No sulphur compounds could be detected in the ethereal extract of the filtrate after the precipitation of the protein.

Properties of Protein A

T., T. and S. found their Protein A to be insoluble in water, but soluble in sodium hydroxide solution, ammonia, or concentrated hydrochloric acid. The sodium hydroxide solution gives reactions for sulphides, but solutions in mild alkalies such as borax or ammonia do not. No mercaptans nor organic sulphides can be detected in the sodium hydroxide solution. Some of this protein was digested with warm normal sodium hydroxide solution until completely dissolved, the solution filtered and reprecipitated by acidification. The precipitate gives the reactions of a protein but contains only 1.67 per cent of sulphur. When this solution in caustic and reprecipitation is repeated, the sulphur content drops to 1.39 per cent, but no further drop is obtained when the purification treatment is again repeated. This product does not give any reaction with lead acetate in the cold, but when dissolved in hot sodium hydroxide solution a brownish color is developed upon warming the solution for a half-hour. From this it appears that a portion of the sulphur is present in a comparatively firm combination, but that sulphur may be removed without destroying the protein-like structure.

The protein gives distinct positive reactions with Millon's reagent, nitric acid, tannic acid, the biuret test, and with other protein reagents. Positive tests for both amino and imino groups are also obtained. When treated with chlorine water, sulphur is removed as sulphuric acid. When 2 grams of Protein A are soaked for two hours in water containing four per cent of chlorine, on the weight of the protein taken, the undissolved residue contains 2.62 per cent of sulphur. With a large excess of chlorine acting for forty-eight hours, the sulphur content is reduced to 0.45 per cent. Upon dissolving 2 grams of A in dilute ammonia, adding an equal volume of a 5-volume hydrogen peroxide and after an hour precipitating the product by acidification, the resulting protein contains 2.68 per cent of sulphur, but some of the original protein has been destroyed and cannot be recovered. Upon heating with water at a pressure of two atmospheres for an hour, the residue contains 2.51 per cent of sulphur and hydrogen sulphide appears to be present. The Hausmann numbers indicate humin nitrogen 2.55 per cent, amide nitrogen 1.2 per cent, diamino nitrogen 12 per cent and monoamino nitrogen 86.25 per cent.

Properties of Protein B

Protein B is insoluble in water but readily soluble in alkalies, being reprecipitated upon neutralization. It gives positive protein reactions and contains both amino and imino groups. It appears to retain its sulphur more firmly than Protein A. When dissolved in normal sodium hydroxide solution, warmed for thirty minutes and reprecipitated, the precipitate contains 1.41 per cent of sulphur. After two more similar digestions, the sulphur content is still 1.40 per cent. Prolonged digestion with warm sodium hydroxide ultimately reduces this to 0.7 per cent. Treatment with hydrogen peroxide, as described under Protein A, only reduces the sulphur content to 1.28 per cent. No sulphur is lost when B is treated with 4 per cent of chlorine, and on prolonged treatment with an excess of chlorine the sulphur is only reduced to 1.11 per cent. Heating for two hours at two atmospheres pressure with water reduces the sulphur to 1.28 per cent. The Hausmann numbers show a greater proportion of diamino nitrogen than in Protein A. Humin nitrogen 2.45 per cent, amino nitrogen 3.9 per cent, diamino nitrogen 34.3 per cent and monoamino nitrogen 59.35 per cent.

The Amino Acid Constitution of Wool

Some recent work by K. Shibata, *Acta Phytochim 2*, 39-47 (1925), is of considerable interest toward proving

(*Continued on page* 489)

The Inter-relation of Light and Color in Dyeing

Light and Other Agents—Suggested Standard Daylights—Sunlight vs. Flaming Arc—Nature of the Fading Action

A Review of Present Problems

[EDITOR'S NOTE.—*During the course of the recent optical convention an important paper, entitled "Color Problems in the Woolen and Worsted Industries," was read by S. G. Barker, Ph.D., D.I.C., and H. R. Hirst, B.Sc., F.I.C. (both of the British Research Association for the Woolen and Worsted Industries, Leeds). The paper, an account of which is published below, treats mainly of the establishment of color standards and the measurement of light-fastness.*]

THE account by Barker and Hirst of "Color Problems in the Woolen and Worsted Industries" deals with the results obtained by them in the laboratories of the research association, and also gives a general survey of the present position and the problems to be faced. "The paper," state the authors, "deals with two main subjects:

"(1) The provision of a daylight lamp for the determination of the fastness or fugitiveness of dyes.

"(2) The method of fixation of definite standard specifications for shades and colors.

"Under the first heading a survey of the present position with reference to daylight fading lamps is given. The precise requirements for such a lamp are stated and the defects of the lamps available at present are discussed. A method of comparison of the energy distribution in the spectra of various sources of light is given. Results are incorporated showing comparisons of fading of dyes over a large range of shades and colors obtained by the authors in experiments with sunlight and the carbon arc. Further results of photometric measurements relating to sunlight fading are given. The present position regarding the chemical aspect of fading is surveyed fully. The problems of accurate color and shade definition and measurement the influence of water vapor, the effect of temperature variation, and the general influences of external conditions on fading are put forward as they affect the textile trade."

LIGHT AND OTHER AGENTS

The color of a material is clearly of great aesthetic and commercial importance. Two points arise for consideration: the exact shade of the color and the effect on it of external conditions. The external conditions may be chemical (such as the effect of alkalies, acids, perspiration, etc.) or physical (such as the effect of humidity, temperature, light, etc.). It is mainly in regard to the measurement of the physical actions that difficulties have arisen. Consider, for example, the effect of sunlight on dyed materials. This effect is well known, and if it is to be measured it is clearly necessary that the conditions under which the measurements are made should be comparable with one another. The problem really has two sides. In actual practice it is sunlight which causes change in the color of dyed fabrics; apparently, therefore tests should be carried out in this light. But the nature and intensity of sunlight vary very considerably from time to time and from place to place. Moreover, its action is slow. For these reasons sunlight is useless as a source of light for comparative fading tests. This brings us to the second side of the problem, which is to find some standard source of light which, in the words of the authors, "should be reproducible and constant over long periods, both as to quality and quantity of light. It should produce the same changes in dyed material as would be effected by sunlight if the material were exposed in actual use."

SUGGESTED STANDARD DAYLIGHTS

If measurements are to yield the fullest possible information it is necessary that accurate knowledge should be available of the spectrum of the light used and of the distribution of energy over the various wave lengths. Various suggestions have been made as to the adoption of a "standard daylight": one standard suggested is the radiation emitted by a black body of 5,000 deg. absolute, while another is the average between blue sky light, sunlight, and light given by a black body of temperature 6,500 to 7,000 deg. "If a standard could be fixed, the work of finding a suitable daylight lamp would be definite, for a close approximation to the same energy distribution would be aimed at." In this connection the authors give an account of a method which they have adopted for comparing the energy distribution of various sources of artificial light, which they are using for the examination of sources of light for artificial daylight fading experiments. Experiments already made by others showed that for a certain artificial daylight lamp, as compared with sunlight, there was "an excess of energy at the extreme red (long wave length) end of the spectrum and a deficiency in the extreme violet (short wave length)."

"Further, experience has shown that these radiations

beyond the visible spectrum are extremely powerful in effecting color deterioration. Certain dyes, known as sensitive tints, show different shades when illuminated by light from different sources; this phenomenon is due to strong absorption of the central portions of the visible spectrum and a consequent variation of shade and color when there is variation at the extreme ends. It seems therefore that a source of light must be found which shall very closely reproduce daylight or sunlight without the use of filters, and then be corrected to a limited extent by filtration or reflection."

The spectra of various illuminants, including the violet carbon arc, have been examined with a view to finding how these light sources accord with requirements. "The last is certainly among the best obtainable for the purpose of fading tests, but our results show that they are really not a good criterion of what actually happens in sunlight under varying atmospheric conditions." The tungsten carbon arc, which is extremely rich in the ultra-violet, and the mercury vapor lamp have both been put forward as standard sources. Hermann concludes, as a result of his work, that "ultra-violet light from the mercury lamp is not a satisfactory substitute for daylight in fading tests." Further, the view is put forward that different wave lengths have different bleaching power.

Sunlight *vs.* Flaming Arc

In view of the growing use of the flaming arc lamp as a substitute for daylight in fading tests, the authors have carried out a large number of experiments in which comparison was made of the effect of exposing worsted patterns dyed with typical dyes to sunlight and to the flaming arc, the daylight tests being for four periods of fourteen days and the arc tests for two periods of seventy hours, the latter being carried out at a temperature of 132 deg. Fahr. and relative humidity 75 per cent. As a result of these tests, which are incorporated in the paper in tabular form, it is stated that "the main thing to notice is that the electric arc fading does not place the dyes in order of fastness to sunlight. . . . In all cases the fabrics were dyed according to the normal instructions of the dye makers. The exposures to sunlight were made during July, August, and September, 1925. The average relative humidity of the atmosphere was 80.5 per cent. We have not yet had the opportunity of investigating personally the effect of variation of relative humidity of the atmosphere surrounding the patterns, but we give the results because they have been obtained in a manner generally adopted by the trade. The results are not satisfactory, and if such a method is generally used in its present state misleading conclusions will be obtained. Further investigation is necessary, and possibly some modification in the source of light and in the method adopted to control the humidity will have to be made."

Little work has been done on the effects of pure monochromatic light (e. g., light of one particular wave length). Clearly such work might give rise to results of very great value. Depierre and Clouet, in 1885, carried out an examination of the effect of different colored lights on 76 colors dyed on calico.

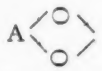
"They found that red rays had the least action yellow rays exerted the strongest action on material dyed red or blue, and blue rays had the greatest effect on orange, yellow, green and violet. It was also found that white light had the greatest fading action, and that light complementary to the color of the fabric had a great fading action, and that a colored light essentially the same shade as that of the fabric had no effect."

Manufacturers classify their colors in degrees of fastness. The authors have suggested a modified standard classification for general use. Sometimes curious phenomena may occur. From a knowledge of the fastness of two dyes separately it is not always possible to predict correctly the fastness of a mixture of the two. For example, picric acid and indigo carmine are both very fugitive; yet a mixture of the two in certain proportions gave a fast result.

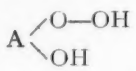
It should be observed that the effect of light on dyed materials varies with nature of the constituents of the air surrounding the materials. If the materials are exposed in evacuated glass tubes, or in tubes filled with inert gases, then (according to Chevreul and others) practically no fading occurs in sunlight. But hydrogen, nitrogen, oxygen and water all seem to react with dyed fibers in sunlight. "Brownlie states that an alkaline atmosphere increases the bleaching effect of sunlight on the dyed fiber system, whereas an acid atmosphere reduces the amount of fading. Alcohol and pyridine increase enormously the bleaching effect of sunlight. Chloroform or solvent naphtha slightly retard the fading, and some other organic solvents have no influence. The statement that alkali increases fading appears to be generally accepted, but this statement should be taken only as approximate. We have found exceptions to this rule and are investigating the matter more fully; it is, however, important that when patterns are tested, they should be either alkaline or acid, according to the conditions under which the material is to be used." Increasing humidity of the atmosphere seems to increase the rate of fading in sunlight Increased rapidity of fading in sea air is due partly to this cause, partly to the presence of hydrogen peroxide and ozone, and partly also to the fact that much light is reflected from the surface of the water, thereby increasing the amount of light incident on the dyed material. The latter is probably the reason for the increased bleaching effect of light in snow-covered areas, especially as snow has great reflective powers toward ultra-violet light. In drying furs, "burning" occurs on exposure when snow is on the ground or in hot sunshine. "In all cases one must consider the effect, not of light alone, but of light plus air, and it would be preferable to speak of atmospheric fading rather than light fading."

The chemical reactions which occur during fading in

sunlight have been the subject of much speculation. Gebhard is of opinion that oxygen acts on water, forming hydroxyl and perhydroxyl (OOH) ions, after which reaction with the dye occurs. It has been shown experimentally that in solution the greatest amount of fading occurs when the concentration of perhydroxyl ions is greatest. "In pure dry air, relatively stable peroxides are formed which show reactions for peroxides and not hydrogen peroxide before any color change is visible; but on the admission of moisture, perhydroxides tend to be formed and there is more rapid destruction of color. We have two types of peroxides formed:



a relatively stable form; and a labile highly reactive one, of the peroxide hydrate type,



The dye peroxides are formed during exposure to dry air, but peroxide hydrates result from the addition of perhydroxyl ions by the union of oxygen atoms with the ions of water." These conclusions of Gebhard have been criticized.

It seems probable that fading is a photochemical surface reaction. Catalytic effects must therefore play their part. For example, surface action depends on the amount of surface area. Cotton fibers are flat and ribbon-like, while wool fibers are elliptical—almost circular—in cross-section; and the difference may give rise to very different fading results when other conditions are the same.

"Grotthus stated that only those rays of light which are absorbed are effective in producing chemical change. The reduction of color may be due to either oxidation or reduction. The formation of a dye is generally an exothermal process, while its decomposition is due to an endothermal reaction which is brought about by the application either of light or of electrical energy. The law of Ritter, Herschel and Becquerel states that rays of long wave length exert an oxidizing action, as opposed to the reducing action of rays of short wave length. It thus appears that both types of reaction can occur and, arguing from the statement that absorbed rays only are effective, some relation might be established between the fading of certain colors (say red or blue) and their behavior to oxidizing and reducing agents. It is also known that when dyed patterns were exposed by Prof. Rutherford to positively charged helium atoms from radium emanation, cellulose was greatly damaged and many direct and basic colors and indigo were bleached, but little action was observed on Indanthrene and Para Red."

Some absolute method of measuring the amount of fading must be found. For color matching the tintometer seems to be the most practical British system. The authors conclude as follows: "The standardization of the colors and shades of all dyes on some definite system is absolutely vital to the dyer, and a method of determining the exact amount of fading under various conditions so as to grade these dyes into order of fastness or fugitiveness is equally important to the textile trade. In conclusion, we would point out that dyeing is not only a science but an art. There are many unknown variable factors such as the selective affinity of wool fibers for dyes, etc., which have to be remembered and which are corrected directly by the experience and judgment of the operator. Yet scientific investigation is an absolute essential to the future progress of the dyer, and, in presenting the two problems stated at the beginning of our paper we put forward what we consider the most important of the questions to be answered before further work can proceed.—Chemical Age.

A SCHOOL OF MICROSCOPY

Charles P. Titus, expert microscopist and former president of the New Jersey Chemical Society, has organized a School of Microscopy in the Pershing Square Building, New York City, according to a recent notice in Industrial and Engineering Chemistry, to meet the growing need for instruction in the use of the microscope, especially for those who have not the time nor opportunity for college or technical courses in which the microscope is used.

Through the courtesy of Bausch & Lomb Optical Company, free use of their rooms and equipment was secured, and the course of ten lessons is now under way. Classes are held Wednesdays, 5 to 6.30 P. M. Other classes to meet evenings are being formed. The moderate fees charged are just sufficient to pay the instructors, and the students get practical experience in the use of the microscope, accessories, sectioning, staining, mounting, also in photomicrography and making of prints and lantern slides.

The teaching staff comprises John H. Fisher, formerly with the Bureau of Standards at Washington, inventor of the Helixometer, an instrument for examining and measuring the pitch of rifling in gun barrels. Philip O. Gravelle, winner of the Barnard Medal for photomicrography, conducts the classes in that subject, and allied branches of microscopy. Dr. Margaret H. Hoskins, of the Dental College, connected with New York University, has charge of instruction in the technical preparation of material and practical slide making.

SWEDEN'S DYESTUFF TRADE

There is practically no manufacture of dyestuffs in the vicinity of Goteberg, according to Vice-Consul G. B. Seawright of that city, and those generally sold and used there are imported from Germany and Switzerland with small quantities from other countries. It is reported that a Dutch firm has recently entered this market and is underselling the German producers, and although working with a limited number of colors their sales are said to be in large lots.

Foreign Dyes Imported Through New York and Other Ports During June

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

1—THE SIX LEADING GERMAN COMPANIES

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg. near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887.

4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

IMPORTS of foreign coal-tar dyes through New York and other ports during the month of June totaled 333,319 pounds, with an invoice value of $317,896. Imports by ports were as follows: New York, 304,986 pounds, valued at $294,731; Boston, 21,897 pounds, valued at $15,579; Albany, 6,436 pounds, valued at $7,586.

Imports of Synthetic Dyes

	1926		1925	
	Pounds	Invoice Value	Pounds	Invoice Value
January	190,459	$184,018	403,984	$359,376
February	479,027	477,255	373,259	365,268
March	487,804	435,891	527,964	488,501
April	437,526	401,606	451,005	426,141
May	392,739	343,745	370,271	347,904
June	333,319	317,896	376,668	333,654
Total	2,320,874	$2,160,411	2,503,151	$2,320,844

Five Leading Dyes, by Quantity, Imported During June, 1926

	Pounds
Cross-Dye Green B	19,446
Ciba Scarlets (single strength)	13,365
Rhodamine 6GDN Extra (single strength)	10,715
Ciba Red 3B (single strength)	8,212
Hydron Printing Black RD Paste	7,500

Per Cent of Dyes by Country of Shipment

	1926			
	June	May	April	March
Germany	51.5	60.0	51.5	48.0
Switzerland	36.0	28.0	38.0	34.0
France	1.0	1.0	2.0	3.0
England	7.5	3.0	2.0	6.0
Belgium	3.0	5.5	3.5	4.0
Canada	0.5	0.5	1.0	2.5
Italy	0.5	1.0	2.0	2.0
Holland	..	1.0	..	0.5

Dyes and Intermediates Remaining in Bonded Customs Warehouse

	Coal-Tar Dyes and Colors (pounds)	Coal-Tar Intermediates (pounds)
July 31, 1925	775,916	1,378,837
August 31, 1925	767,431	1,363,760
September 30, 1925	709,381	1,359,717
October 31, 1925	609,750	1,055,241
November 30, 1925	521,238	746,226
December 31, 1925	633,525	758,618
January 31, 1926	703,159	763,409
February 28, 1926	596,154	855,170
March 31, 1926	447,588	896,530
April 30, 1926	359,164	928,593
May 31, 1926	535,226	946,120

Imports of Color Lakes

	Pounds	Invoice Value
January	2,773	$2,393
February	143	....
March	58	....
April	834	....
May	3,360	3,077
June	2,720	1,598

The dyes in this report are grouped by both Colour Index and Schultz numbers, and, in the case of those which could not be identified by either number, the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

DYES OF COAL-TAR ORIGIN

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
24	36	Moti Orange R—(t-M)	200
40	58	Chrome Orange R—(DH)	110
80	83	Ponceau 3R—(IG)	50
104	—	Metachrome Olive Brown G—(Bro.)	1,000
135	126	Blue J (Janus Blue G)—(IG)	50
167	154	Pilatus Chrome Brown RX—(IG)	1,500
172	159	Acid Aliarine Black R—(IG)	500
173	—	Metachrome Violet B—(IG)	500
196	175	Acid Ponceau E—(G)	220
288	256	Sulphon Cyanine G—(IG)	500
307	265	Aci Milling Black B—(G)	2,205
317	274	Diazo Fast Black MG—(IG)	485
319	—	Benzo Fast Heliotrope BL—(By)	447
324	—	Diazo Brilliant Orange GR Extra (IG) Diazo Brilliant Scarlet ROA Extra (IG)	1,000
346	296	Cotton Yellow G Extra—(IG)	100
357	300	Brilliant Carmine L Conc.—(B)	200
403	—	Diphenyl Fast Gray BC—(G)	331
409	339	Diamine Orange B—(C)	694
436	358	Chloramine Brilliant Red 8B Conc.—(S) Chloramine Red 8BS—(By)	1,998
443	—	Acid Milling Red G Conc.—(G)	223
449	364	Diazo Brilliant Black B—(IG)	882
459	373	Congo Orange R—(IG)	500
487	400	Acid Milling Red R Conc.—(G)	1,653
488	404	Diamine Yellow N—(C)	273
543	404	Diamine Brilliant Bordeaux R—(IG)	100
596	476	Benzo Chrome Brown G—(IG)	101
628	206	Diphenyl Catechine G Supra—(G)	4,409
629	207	Diphenyl Fast Brown GF—(G)	441
658	496	Setoglaucine—(G)	551
663	500	Setocyanine—(G)	110
667	503	Erioviridine B Supra—(G) Poseidon Green SGX—(IG)	941
671	506	Erioglaucine AP—(G) Erioglaucine EP—(G)	6,102
672	507	Xylene Blue VS Conc.—(S)	1,000
680	515	Methyl Violet NFB—(IG)	2,000
681	516	Crystal Violet Extra—(IG)	500
699	531	Eriocyanine AC—(G)	2,205
701	533	Acid Violet 7BN—(IG)	50
705	537	Methyl Silk Blue New—(G)	110
712	543	Brilliant Acid Blue V—(By) Patent Blue V—(IG)	1,200
714	545	Kiton Blue A—(I) Neptune Blue BR Conc.—(IG) Patent Blue A—(M) Poseidon Blue BXX—(IG)	1,371
715	546	Blue Extra—(IG)	500
720	551	Eriochrome Azurol BC—(G)	2,205
722	553	Eriochrome Cyanine RC—(G)	1,102
723	554	Chrome Azurol S Conc.—(G)	1,102
727	557	Chrome Violet—(G)	110
729	559	Victoria Blue B Base—(IG) Victoria Pure Blue BO—(IG) Victoria Pure Blue BO—(By)	1,257
735	564	Naphthalene Green Conc.—(IG)	100
736	565	Wool Blue G Extra—(IG)	100
748	579	Sulpho Rosazeine B Extra—(IG)	200
749	573	Rhodamine B Conc. (s. s.)—(G) Rhodamine B Extra (s. s.)—(B) Rhodamine B Extra (s. s.)—(IG)	4,625
762	—	Chromorhodine BN—(DH)	441
786	—	Auracine G—(G)	220
788	603	Rhoduline Orange NO—(By)	337
789	—	Patent Phosphine G—(I) Patent Phosphine M—(I)	3,526
793	606	Phosphine 3R—(IG)	2,000
833	—	Wool Fast Blue BL—(By) Wool Fast Blue GL—(By) Xylene Milling Blue AE Conc.—(S) Xylene Milling Blue BL Conc.—(S)	5,247
845	687	Methylene Heliotrope Extra Strong—(IG)	25
851	690	Diphene Blue B—(IG)	3,700
865	700	Silver Gray P—(IG)	25
871	922	Diphenyl Black Base I—(IG)	500
873	681	New Fast Gray—(By)	100
875	923	Fur Blue Black A—(IG) Fur Brown 4R Paste—(IG) Fur Brown SK—(IG) Fur Gray ALA—(IG)	720
879	—	Chromazurine G—(I)	1,102
882	625	Gallo Heliotrope BD Powder—(IG)	100
884	627	Chromacetine Blue S Extra—(DH)	441
892	635	Modern Violet—(DH) Ultra Violet MO—(S)	1,823
894	637	Gallamine Blue Extra Paste—(G)	4,894
898	637	Fast Green G—(IG)	100

(*Continued on page* 483)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa.

Southern Section—
Leonard S. Little, Chairman, Pacific Mills, Lyman, S. C.
Harry W. Ormand, Secretary, Union Bleachery, Greenville, S. C.

THE THIRTY-FIFTH RESEARCH COMMITTEE MEETING

The thirty-fifth meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineers' Club, Boston, Mass., on June 25, 1926.

The following members were in attendance: L. A. Olney, W. D. Livermore, W. M. Scott, W. K. Robbins, W. C. Durfee, J. F. Bannan, G. A. Moran, W. H. Cady, P. J. Wood, W. D. Appel, H. W. Leitch and W. E. Hadley.

The association has been endeavoring to work in cooperation with the Society of Dyers and Colourists in the matter of fastness tests; several members of the Research Committee of the association have been appointed, with whom specially designated members of the foregoing society, who are interested along the same lines, could correspond in an endeavor to arrive at some mutual understanding regarding the fastness tests for cotton, wool and silk. The chairmen of the respective committees were designated by the president to fill these positions: G. A. Moran, representing the cotton industry; W. D. Livermore, representing the woolen industry; W. M. Scott, representing the silk industry.

The plans and preparations of material for the 1926 Year Book were entered into with more or less detail and it was decided that certain of the provisional fastness methods appearing in the 1925 Year Book would be revised in accordance with the latest suggestions which have been received, and while it was felt that, of necessity, these reports could not yet be considered as final, it was the consensus of opinion of members of the Research Committee that the very latest suggestions available should be embodied in these reports.

W. H. Cady gave a review of the work which has been accomplished by his committee in regard to light fastness trials. It was voted that samples of material be exposed, if possible, to California sunlight, and steps are being taken to bring about these exposures.

W. D. Appel reported that he had now received criticisms and suggestions from all the laboratories to whom he had submitted samples with the object of obtaining suggestions and criticisms of the tentative fastness tests appearing in the 1925 Year Book. He stated that the last of these reports have only reached his office within a few days and that he would immediately compile the results and communicate with the Research Committee regarding his findings.

It was decided to add several new groups of dyes to the list of American colors in the Year Book and these will include Certified Food Dyes, Fur Dyes, etc.

L. A. Olney and W. D. Appel, as members of the committee of the Converters' Association, reported in regard to the work that committee is doing at the present time and asked the various members of the Research Committee for their advice concerning various points which had not as yet been definitely settled.

Samples of red and blue bunting which had been submitted by the War Department for advice as to their practicability were examined and discussed by the Research

Committee and the president will report directly to the War Department in regard to this matter.

Respectfully submitted,

W. E. HADLEY, *Secretary.*

SUMMER OUTING OF NORTHERN NEW ENGLAND SECTION

The Northern New England Section of the American Association of Textile Chemists and Colorists held its summer outing at the Merrimack Valley Country Club, Methuen, Mass., on Friday, June 11. Features of the day's program included golf and tennis tournaments, baseball and horseshoe pitching. In the evening members and guests gathered in the banquet hall of the club for dinner.

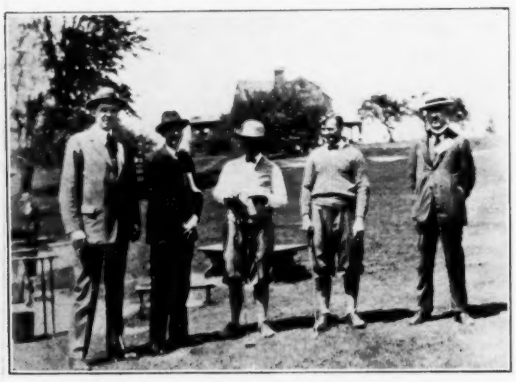
In the golf tournament, J. E. Bradley captured the guest prize and Woodward Allen the member's trophy. At the 19th green the players assembled to watch an exhibition of trick shots by John Dalton.

A series of lively baseball games were staged by four closely matched teams, namely, Massachusetts Institute of Technology nine (captain, Alex Morrison); School of Hard Knocks (captain, W. F. Brandy); Lowell Textile School (captain, J. M. Washburn), and American Association of Textile Chemists and Colorists (captain, Henry Grimes). In the final battle of the series the School of Hard Knocks defeated the Association nine, Bill Brandy's skillful pitching shutting out the losing team without a hit. After the game it was rumored that the umpiring of Joe Travers had attracted some of the big league scouts.

A vigorous horseshoe pitching match, in which the strong-arm members participated, rivaled the baseball games in interest and sportsmanship. Louis Bume entertained the players after the match by an exhibition of fancy pitching.

The dinner served in the banquet hall of the club in the evening was well attended and was an enjoyable close to an active day. To the accompaniment of an orchestra the members sang and dined and were entertained by solos rendered by Alex Tainscle, the Shawsheen nightingale, and by the Old Grand Dad Quartette, composed of J. H. Grady, H. D. Grimes, William T. Brandy and M. J. Lane. Perry White drew considerable applause by his amusing character sketches. During the dinner Chairman John Bannan introduced "Dr. Fochervitch" (alias Hy Selya) who gave a humorous talk on dyestuff devel-

The A. A. T. C. C. Team



Golfers at New England Section Outing

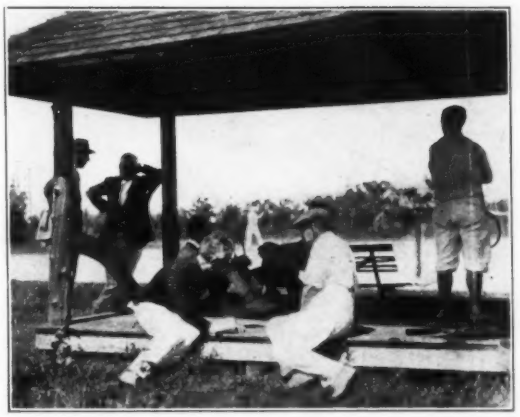
Some of Those Present: New Engl

opments abroad. Prizes were then awarded by S. E. Sampson to the winners of the sports events.

A brief business meeting after the dinner was called to order by Chairman Bannan, and the results of the election of officers for the coming year announced as follows: Chairman, Harold Leitch; treasurer, Walter Durfee; secretary, Arthur Johnson; members of Executive Committee, John Bannan and Hugh Christison. After a short address by the chairman-elect, the meeting adjourned.

The M. I. T. Nine

t: New England Section Outing



Tennis-Score Keepers: Alan Claflin (left) and Joseph Bannan

NEW YORK SECTION OUTING

The annual summer outing of the New York Section was held at the Elmwood Country Club, East Paterson, N. J., on Friday, June 25.

The morning was devoted to golf, the cup for low gross score being won by P. H. Scott and the cup for low net score being won by Felix L. Bume.

After lunch a tennis tournament was held, which resulted in the cup going to Louis S. Hirsch. There was also an extempore baseball game and other outdoor sports.

Dinner, following the outdoor activities, was enlivened by the presence of various members of the Section masquerading as prominent European persons. The personnel of these "guests of honor" included Daniel P. Knowland as H. R. H. the Prince of Wales, Dr. F. X. Harrold as his Naval Aide and Fred

More Golfers

Chairman Bannan (left) and Chairman-elect Leitch of Northern New England Section

Bonnett as his Military Aide, Carl Puller as H. R. H. the Crown Prince of Sweden, L. C. Scott as the Sultan of Turkey, Ned Willis as his servant, Karl Skalnick as Leon Trotsky and Arthur Wiehl as Mussolini. These notables entertained the diners with remarks intended to be witty.

The attendance was in the neighborhood of one hundred, and all present voted the occasion a great success. The committee in charge was D. P. Knowland, C. H. Schaumann and A. P. Howes.

DANIEL P. KNOWLAND, *Secretary.*

THE THIRTY-NINTH COUNCIL MEETING

The Thirty-ninth Council Meeting of the American Association of Textile Chemists & Colorists was held at the Engineers' Club, Boston, Mass., on Friday, June 25, 1926. This meeting continued throughout the day, and the following members were in attendance: L. A. Olney, W. D. Livermore, W. M. Scott, W. K. Robbins, W. C. Durfee, J. F. Bannan, G. A. Moran, W. H. Cady and W. E. Hadley.

The following applicants were admitted to membership:

Active Membership

Bateman, John H., superintendent and designer, Southern Worsted Corporation, Paris, S. C. Address: 306 Rutherford Street, Greenville, S. C.

Borho, Ernest, chief chemist. Address: Bellman Brook Bleachery, Fairview, N. J.

Courtney, H. C., dyer and chemist, Knoxville Knitting Mills Company. Address: Keith Avenue, R. No. 8, Knoxville, Tenn.

Dean, J. D., superintendent finishing plant. Address: Pacific Mills, Lyman, S. C.

Diaz, Joseph, Jr., assistant dyer, American Printing Company, Fall River, Mass. Address: Box 125, Swansea, Mass.

Garnett, Gilbert, dyer, Swansea Print Works, Swansea, Mass. Address: Roosevelt Avenue, Pottersville, Mass.

Goettler, Frank H., dyer, Assabet Mills. Address: 3 Bent Avenue, Maynard, Mass.

Hornby, Bertrand L., demonstrator. Address: Ciba Company, New York, N. Y.

Keegan, Chas. I., dyer, Killingly Worsted Mills. Address: R. F. D. No. 1, Killingly, Conn.

King, Theo. C., superintendent, dyeing bleaching and finishing, Cramerton Mills, Inc. Address: Cramerton, N. C.

Laughlin, Edwin T., manager, bleaching and finishing departments, Laughlin Textile Mills, Inc. Address: Mohawk Avenue, Waterford, N. Y.

Lewis, Maurice, chemical salesman, Doe & Ingalls, Boston, Mass. Address: 51 Lafayette Street, Arlington, Mass.

Macormac, Alfred R., textile chemist. Address: Adams Manufacturing Company, Shelton, Conn.

Millikan, L. E., dyer, Aycock Hosiery Mills. Address: 602 Haltre Avenue, South Pittsburg, Tenn.

Nuckolls, Tom J., dyer. Address: Piedmont Plush Mills, Greenville, S. C.

Patterson, Edward V., purchasing agent, National Silk Dyeing Company, Paterson, N. J. Address: 161 Tappan Avenue, Belleville, N. J.

Rothe, Chas. A., dyer, Watkins Hosiery Mills. Address: 1611 Vance, Chattanooga, Tenn.

Schulz, F. Emil, salesman. Address: Carbic Color & Chemical Company, Boston, Mass.

Choosing Sides: Dr. Jennings and Alan Claflin at New England Section Outing

Skinner, Rowland H., color chemist. Address: Nyanza Color & Chemical Company, New York, N. Y.

Wheeler, R. S., superintendent. Address: Crystal Springs Bleachery Company, Chickamauga, Ga.

Winkler, Adolph J., textile research chemist, L. Sonneborn Sons, Inc., Belleville, N. J. Address: 25 McDonough Street, Brooklyn, N. Y.

Yates, Thomas A., vice-president, Yates Bleachery Company. Address: Flintstone, Ga.

Junior Membership

Abbott, W. G., Jr., dyer, Hillsborough Mills. Address: Wilton, N. H.

Armstrong, James F., assistant dyer, Aycock Hosiery Mills. Address: South Pittsburg, Tenn.

Callicott, Joe H., assistant dyer and chemist, Davenport Hosiery Mills. Address: 311 McCallie Avenue, Chattanooga, Tenn.

Edgar, Rachel, assistant professor chemistry. Address: Chemistry Department, Iowa State College, Ames, Iowa.

Jennings, Everett C., student, New Bedford Textile School. Address: 111 Florence Street, New Bedford, Mass.

Knight, James L., chemist, Thomaston Bleachery. Address: Thomaston, Ga.

McNab, Harold E., dyer. Address: Washington Hosiery Mill, Nashville, Tenn.

Tarpey, Thomas J., student, Lowell Textile School. Address: 23 Fremont Street, Somerville, Mass.

Three Junior Members—Ovila H. Demers, Ernest H. Leftwich and Clifford K. Wilbur—were transferred to Active Membership.

Treasurer W. C. Durfee reported that the dues of 132 members remain unpaid for the year 1926, and it was voted to turn this list over to the secretary in order that a special form of letter can be sent to the delinquent members before dropping their names from the membership list in accordance with the constitution.

A motion was made and seconded that the treasurer transfer $1,500 from the general fund to that of the research fund. The motion was carried.

Progress was reported regarding plans from the Annual Meeting which is to be held in Charlotte, N. C., during the first week in December, 1926. In accordance with our regular custom, the Southern Section will take care of the general arrangements for the meeting and the banquet, and the Council will arrange the program regarding technical papers and the speakers.

The secretary reported to the Council that somewhat over 50 per cent of the questionnaires which were recently sent out to the members have been returned and that during the past week a post card was sent out as a reminder to those members who had not as yet returned the questionnaire. More questionnaires are apparently being returned in response to the postals.

The Council reviewed the returned questionnaires and the various subjects suggested for possible papers at the Annual Meeting were compiled, and such a list will shortly be sent to the members of the Council and Research Committee in order that the proper selection of subjects may be made.

Respectfully submitted,

W. E. HADLEY, *Secretary.*

Applicants for Membership

Active Membership

Dengler, Herbert F., salesman and demonstrator, Bachmeier & Co., New York City. Sponsors: C. A. Puller and P. J. Wood.

English, Chas. B., textile chemist, National Duo Dye Company, Paterson, N. J. Sponsors: L. C. Scott and F. M. Bonnett.

Firth, Elwood T., demonstrator, Sandoz Chemical Works, Inc., New York City, N. Y. Sponsors: H. J. Stulz and F. M. Bonnett.

Grassey, Henry, foreman dyer, Atlas Finishing Company, Paterson, N. J. Sponsors: W. E. Mitchell and C. A. Puller.

Green L. E., demonstrator, Du Pont Company, Charlotte, N. C. Sponsors: H. W. Ormand and L. N. Hood.

Hayde, Thos., salesman and demonstrator, Earle & Co., New York City, N. Y. Sponsors: C. A. Puller and P. J. Wood.

Klotz, Oliver G., textile chemist, Wm. F. Taubel Inc., Riverside, N. J. Sponsors: S. F. Carter and Dr. A. Pfister.

Laube, Alex F., salesman and demonstrator, Sandoz & Co., New York City, N. Y. Sponsors: C. A. Puller and O. H. Genssler.

McMullen, Jr., Wm. M., salesman and demonstrator, Oakes Manufacturing Company, Brooklyn, N. Y. Sponsors: C. A. Puller and P. J. Wood.

Morningstar, Robert P., sales manager, J. Morningstar & Co., New York City, N. Y. Sponsors: L. N Hood and R. W. Arrington.

Skalnik, Karl M., colorist foreman, National Duo-Dye Company, Paterson, N. J. Sponsors: L. C. Scott and L. C. Roome.

Sullivan, Walter M., textile chemist, American Woolen Company, Shawsheen Village, Andover, Mass. Sponsors: Alex. Morrison and L. Christison.

Changes of Address

Blair, Jas. A., Jewett City, Conn.
Borrmann, Bernard, 225 Foster Avenue, Brooklyn, N. Y.
Burnham, Frank E., 65 Elm Street, Methuen, Mass.
Chase, R. L., R. F. D., Bristol Highlands, Briston, R. I. (To Sept. 1.)
Clapham, 29 Orchard Street, Rockville, Conn.
Conley, Leander F., 18 Park Street, Ware, Mass.
Crowe, Jos. B., 4613 Mitchell Avenue, Cincinnati, Ohio.
Fischer, R. M., 2743 Greenleaf Street, Allentown, Pa.
Frazee, Maurice D., Box 348, Claremont, N. H.
Glidden, Harlan E., Box 357, Alton Bay, N. H. (Until September 30.)
Guiterman, 143 Boulevard, Passaic, N. J.
Hartwig, Carl E., care of American Burtonizing Company, 125 Lake Avenue, Elm Park, S. I., N. Y.
Holst, Jr., Wm. C., 4020 202nd Street, Bayside, L. I., N. Y.
Kidd, T. E., Box 147, Waterford, Conn.
Kimble, F. M., care of Cherokee Spinning Company, Knoxville, Tenn.
Kuhl, Herbert, 509 Wayland Avenue, Providence, R. I.
Milne, William, Newton, N. J.
Nash, W. F., Miles Street, Millbury, Mass.
Rollins, Henry E., Clifton Silk Dyeing Company, Conshohocken, Pa.
Ruck, H. F., 512 West 179th Street, Apt. 5C, New York City.
Seibert, C. A., 97 Harmony Street, Penns Grove, N. J.
Tanguay, Gerard, 281 Harris Avenue, Woonsocket, Rhode Island.
Toepler, Carl, 913 Radcliff Street, Bristol, Pa.
Wallace, George G., P. O. Box 1572, Atlanta, Ga.
Washburn, 12 Middle Street, Gloucester, Mass.
Wingate, W. H., 32 Huddleston Avenue, Fairhaven, Mass.
Zwann, John C., 15 Orchard Street, Lodi, N. J.

Resignations

Glenn, H. T., care of C. & M. Hosiery Mills, Oxford, N. C.
Matthews, J. Merritt, Mt. Vernon Cottage, Pembroke, Bermuda.
Paradis, Joseph L., 542 County Street, New Bedford, Mass.
Southwick, C. H., 335 South Main Street, Woonsocket, R. I.

Deceased

Sawyer, Joseph W., Franklin, N. H.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

WALTER E. HADLEY,
5 Mountain Avenue,
Maplewood, N. J.

FOREIGN DYE IMPORTS

(*Continued from page 476*)

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
905	645	Gallazine No. 90—(DH)	441
913	653	Danubia Blue BX—(IG)	500
914	654	Danubia Blue BBX—(IG)	50
924	660	Methylene Green G Extra—(S)	500
927	663	New Methylene Blue N—(IG)	1,000
931	667	Indochromine RR Conc.—(S)	500
1006	746	Pyrogene Green 3G—(I)	661
1027	778	Alizarine Red VI Old Paste—(IG)	441
1034	780	Alizarine Red S Powder—(B)	440
1035	782	Anthracene Brown R Powder—(IG)	300
1040	784	Aliarine Red SX Paste—(IG)	2,095
1053	—	Alizarine Blue WS—(By)	
		Alizarine Light Blue SE Conc.—(S)	
		Alizarine Sapphire Blue SE—(I)	1,487
1054	858	Alizarine Light Blue B—(S)	
		Alizarine Sapphire Blue B—(I)	3,440
1066	—	Alizarine Cyclamine R Paste—(IG)	800
1067	804	Alizarine Blue S Powder—(IG)	1,005
1070	807	Aliazrine Black S Paste—(IG)	931
1071	808	Alizarine Green S Paste—(B)	435
1073	852	Alizarine Irisol R—(IG)	623
1075	856	Alizarine Blue AS—(By)	
		Alizarine Astrol B—(IG)	1,701
1078	865	Alizarine Cyanine Green G Ex. Pdr.—(IG)	
		Alizarine Cyanine Green G Ex. Pdr.—(By)	2,374
1084	854	Alizarine Viridine FF Powder—(IG)	50
1088	855	Alizarine Sky Blue—(IG)	
		Alizarine Sky Blue B—(IG)	
		Alizarine Blue SKY—(By)	890
1089	861	Anthraquinone Blue SR Powder—(IG)	200
1091	—	Alizarine Rubine GW—(By)	
		Alizarine Rubine R—(By)	882
1093	850	Vat Blue WB Powder—(B)	1,029
1095	759	Vat Yellow GC Powder (s. s.)—(B)	896
1096	760	Vat Golden Orange G Dbl. Pst. (s. s.)—(IG)	4,930
1097	761	Vat Orange RRT Paste—(IG)	
		Vat Orange RRT Paste Fine—(IG)	7,305
1099	763	Vat Dark Blue BOA Paste Fine—(IG)	2,420
1104	767	Vat Brilliant Violet RRP Powder—(B)	331
1108	839	Vat Blue RK Paste—(By)	399
1113	842	Vat Blue GCD Dbl. Pst. Fine (s. s.)—(IG)	4,004
1114	—	Vat Blue BCS Powder (s. s.)—(B)	825
1118	849	Vat Yellow G Dbl. Pst. Fine (s. s.)—(IG)	4,982
1143	827	Anthra Bordeaux R Paste—(IG)	
		Anthra Bordeaux R Paste Fine—(B)	2,447
1145	834	Vat Gray GK Paste—(IG)	800
1150	833	Vat Olive R Paste—(IG)	
		Vat Olive R Powder (s. s.)—(IG)	5,200
1151	—	Indanthrene Brown R Paste—(By)	1,995
1152	—	Vat Brown G Paste—(IG)	
		Vat Brown G Powder (s. s.)—(IG)	6,010
1173	793	Cibanone Blue 3G Paste—(I)	2,204
1183	880	Indigo BASFIRB Pure Paste—(IG)	200
1184	881	Brilliant Indigo 4B Paste Fine—(IG)	5,140
1190	885	Brilliant Indigo B Paste—(IG)	2,530
1207	912	Anthra Red B Paste—(IG)	492
1209	917	Helindone Red B Powder (s. s.)—(IG)	250
1211	910	Vat Rose AN Paste—(M)	
		Vat Rose BN Paste—(M)	1,323
1212	918	Ciba Red 3B Powder (s. s.)—(I)	
		Thioindigo Red 3B Paste—(K)	
		Vat Red Violet RH Paste Fine—(IG)	8,212
1228	907	Anthra Scarlet 2G Paste Fine—(IG)	
		Thioindigo Scarlet 2G Paste—(K)	13,365
1229	902	Ciba Red R Paste—(I)	6,392

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Pure Blue R Supra—(G)	1,102
Acid Rhodamine BG—(IG)	250
Alizarine Direct Blue BB Powder—(IG)	20
Alizarine Irisol B Powder—(By)	50
Alizarine Leveling Blue CA—(C)	100
Alizarine Supra Blue A—(IG)	600
Alkali Fast Green 10G—(IG)	500
Astra Phloxine FF Extra—(IG)	2,000
Brilliant Acid Blue EG—(By)	500
Brilliant Wool Blue FFR Extra—(By)	1,000
Fast Acid Green BB Extra—(IG)	500
Fast Cyanine Blue B—(I)	110
Fast Cyanine Violet B—(I)	110
Guinea Fast Green B—(IG)	900
Indocyanine B—(IG)	7,198
Indocyanine BF—(IG)	200
Kiton Fast Red 4BL—(I)	331
Milling Yellow O—(IG)	500
Neolan Blue G—(I)	551
Neolan Green B—(I)	2,204
Neolan Pink B—(I)	7,164
Neolan Pink G—(I)	2,756
Neolan Yellow G—(I)	5,512
Neolan Yellow GR—(I)	5,511
Neotolyl Black TL Extra—(IG)	25
Novazol Blue B—(G)	441
Novazol Violet B—(G)	441
Onis (Anthosine) B—(IG)	100
Onis (Anthosine) 3B—(IG)	200
Polar Orange R Conc.—(G)	1,102
Sulphon Orange G—(By)	572
Sulphon Yellow 5G—(By)	400
Supramine Brown G—(IG)	100
Wool Black GRF—(IG)	500
Wool Blue N Extra Powder—(By)	255
Wool Blue RR Extra Powder—(By)	660
Wool Fast Yellow 5G—(By)	92
Xylene Fast Blue FF Conc.—(S)	2,759

Vat Dyes

Ciba Pink BG Powder (s. s.)—(I)	1,655
Cibanone Red G Powder—(I)	551
Grelanone Olive B Powder—(GrE)	40
Helindone Blue 3G Powder—(IG)	50
Helindone Fast Scarlet G Paste—(IG)	1,500
Helindone Printing Black RD Paste—(IG)	7,500
Hydron Brown R Paste—(C)	146
Hydron Pink FB Paste—(C)	833
Hydron Scarlet 2B Paste—(C)	285
Hydron Scarlet 3B Paste—(C)	389
Hydron Yellow GG Powder—(IG)	100
Indanthrene Brown GG Paste—(By)	
Indanthrene Brown GG Powder (s. s.)—(IG)	1,197
Indigosol Black TB—(DH)	55
Indigosol Pink HR Extra—(DH)	22
Sandothrene Blue NG—(S)	100
Soledon Brilliant Purple RR Paste—(SD)	15
Soledon Yellow G—(SD)	15
Vat Blue RZ Double Paste (s. s.)—(IG)	4,928
Vat Blue Green B Double Paste (s. s.)—(B)	996
Vat Khaki GG Paste—(IG)	1,500
Vat Printing Red BG Paste—(IG)	300
Vat Scarlet G Extra—(S)	50
Vat Yellow 6G Powder—(IG)	50

Name of Dye and Manufacturer	Quantity (pounds)
Vat Yellow 6GD Powder—(IG)	50
Vat Yellow Brown 3G Paste—(IG)	500

Mordant and Chrome Dyes

Acid Alizarine Gray G Powder—(M)	498
Acid Anthracene Brown PG—(By)	
Acid Anthracene Brown PG—(IG)	1,941
Acid Anthracene Red 5BL—(By)	100
Anthracene Chromate Brown EB—(IG)	1,000
Brilliant Chrome Violet 3RN—(DH)	220
Chromazurine DN—(DH)	110
Chrome Gray III—(DH)	11
Chrome Printing Orange 3R—(I)	128
Chrome Printing Red Y—(DH)	441
Chromocitronine 3R—(DH)	220
Chromoxane Pure Blue B—(By)	331
Chromoxane Violet 5B—(By)	100
Eriochrome Brilliant Violet B Supra—(G)	661
Eriochrome Red G—(G)	1,102
Eriochrome Yellow G Paste—(G)	2,899
Metachrome Blue Black 2BX—(IG)	2,441
Metachrome Brilliant Blue BL—(IG)	200
Metachrome Red G—(IG)	200
Metachrome Violet 2R—(IG)	400
Modern Gray CVX—(DH)	110

Direct Dyes

Benzo Fast Black L—(IG)	1,000
Benzo Fast Blue G—(IG)	474
Benzo Fast Blue 4GL—(By)	500
Benzo Fast Bordeaux 6BL—(By)	525
Benzo Fast Brown GL—(By)	200
enzo Fast Brown 3GL—(IG)	1,350
Benzo Fast Brown RL—(IG)	100
Benzo Fast Gray BL—(IG)	1,007
Benzo Fast Heliotrope 5RH—(By)	200
Benzo Rhoduline Red B—(By)	100
Brilliant Benzo Green B—(IG)	500
Brilliant Pure Yellow 6G Extra—(By)	220
Chicago Red III—(G)	1,102
Chlorantine Fast Bordeaux 2BL—(I)	661
Chlorantine Fast Gray B—(I)	1,763
Chlorantine Fast Green B—(I)	1,102
Chlorantine Fast Orange 2RL—(I)	220
Columbia Catechine G—(IG)	500
Diamine Steel Blue L—(IG)	50
Diamine Fast Brown GB—(IG)	500
Diamine Fast Brown GHB—(IG)	500
Diamine Fast Orange EG—(IG)	500
Diamine Fast Orange ER—(IG)	500
Diaminogene Blue GG—(C)	443
Diazine Black G—(IG)	50
Diazo Brilliant Blue 2BL Extra—(By)	100
Diazo Brilliant Green 3G—(By)	551
Diazo Brilliant Orange 5G—(By)	500
Diazo Brilliant Scarlet B Extra—(By)	441
Diazo Brilliant Scarlet 2BN—(By)	882
Diazo Brilliant Scarlet S4B—(By)	99
Diazo Brown BW—(I)	110
Diazo Sky Blue 3GL—(By)	1,073
Diazophenyl Black V—(G)	2,205
Diphenyl Fast Bronze B—(G)	2,205
Diphenyl Fast Brown GNC—(G)	2,205
Fast Cotton Brown 4RL—(IG)	200
Fast Cotton Gray BL, VL—(IG)	550
Fast Cotton Rubine B—(IG)	100
Formal Fast Black G Conc.—(G)	330
Half-Wool Blue 3R—(IG)	1,000
New Bordeaux RX—(IG)	50
Paper Red A Extra—(IG)	500
Para Brilliant Orange G—(IG)	250
Para Brown GK—(IG)	600
Para Brown RK—(IG)	550
Pluto Brown GG—(IG)	100
Rosanthrene Fast Red 7BL—(I)	220
Rosanthrene Orange R—(I)	441
Sky Blue N—(I)	200
Trisulphon Bronze BG Conc.—(S)	200

Dyes for Artificial Silk

Artificial Silk Black R—(IG)	200
Azonine Direct Blue B Paste—(IG)	200
Cellit Fast Red B—(IG)	50
Dispersal Yellow 3G Paste—(BD)	116
Duranol Blue G Paste—(BD)	116
Duranol Orange G Paste—(BD)	232
Duranol Red G Paste—(BD)	212
Pink R Extra—(IG)	50
Setacyl Direct Blue G Powder—(G)	220

Rapid Fast Dyes

Rapid Fast Orange RG Paste—(By)	200
Rapid Fast Red GL Paste—(IG)	1,000
Rapid Fast Red GZ Paste—(IG)	600

Basic Dyes

Acridine Scarlet J—(DH)	55
Brilliant Acridine Orange 3R—(DH)	220
Brilliant Rhoduline Blue R—(IG)	500
Rhodamine 6GDN Extra (s. s.)—(B)	10,715

Sulphur Dyes

Cross-Dye Green B—(BD)	19,446
Indocarbon SN—(IG)	200
Thional Brilliant Green GG Conc.—(S)	2,000
Thionol Yellow GR—(BD)	1,775

Color Lake Dyes

East Lake Yellow G Powder—(Q)	220
Hansa Yellow G Powder—(IG)	1,000
Helio Bordeaux BL Powder—(By)	510
Helio Red RMT Extra Powder—(IG)	200
Paper Fast Bordeaux B—(IG)	500

Unclassified Dyes

Cibacete Navy Blue 3R Powder—(I)	486
Cibacete Orange 3G Powder—(I)	132
Cibacete Scarlet G Powder—(I)	22
Cibacete Yellow 2R Powder—(I)	44
Luxine Orange R—(DH)	11

A LIST OF APPRAISEMENT OF COAL-TAR PRODUCTS WITHIN PARAGRAPHS 27 AND 28 OF TARIFF ACT OF 1922

The following supplemental list contains the month of entry, the name of the product within paragraphs 27 and 28, together with the designation as "C" (for competitive) and "NC" (for non-competitive), which indicates the appraisement basis for the assessment of the ad valorem duty in paragraphs 27 and 28 of the Tariff Act of 1922.

The ad valorem rate for competitive dyes is based on the American selling prices as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes

is based on the United States value as defined in Subdivision (d) of Section 402 of Title IV of the Tariff Act of 1922.

This third list contains the appraisements received since the publication of the June list for the Port of New York, beginning with January, 1926.

JANUARY

Acetol Purpurine 8B	NC
Acid Alizarine Gray G	NC
Acid Blue RBF	NC
Alizarine Sapphire Blue B	C
Anthra Bordeaux R Paste	NC
Anthosine 3B	NC
Brilliant Acridine Orange 3R	NC
Brilliant Congo Blue 5R	NC
Ciba Orange G Paste	NC
Columbia Catechine 3B	NC
Cotoneral G Extra	NC
Cotoneral 2G Extra	NC
Developed Brilliant Orange 5G Extra	NC
Developing Blue B	C
Diamine Fast Orange ER	C
Diaminogene GG	NC
Direct Red 12B Powder	C
Fast Cotton Red 8BL	C
Fur Black DG	C
Fur Blue Black B	NC
Fur Brown P	C
Fur Gray G	NC
Fur Yellow 2G	C
Indocyanine B	NC
Kiton Fast Red R	NC
Kiton Fast Yellow 3G	C
Lanosol Blue R	NC
Metachrome Blue Black 2BX	NC
Metachrome Olive 2G	NC
Milling Red 4BA	NC
Milling Red 6BA	NC
Neolan Blue 2G	NC
Oxychrome Brilliant Blue PB	NC
Patent Blue A Powder	C
Patent Phosphine M	NC
Patent Phosphine 2G	C
Shoddy Chrome Black RA	NC
Shoddy Chrome Black TA	NC
Silver Gray P	NC
Sulphur Black MBWJ	
Sulphorhodamine G	NC
Thio Indigo Rose BN Extra Paste	NC
Vat Brown 2G Paste	NC
Victoria Blue B	C
Victoria Blue 4R	NC
Water Blue 67773 Large Lumps	C
Xylene Fast Blue FF Conc	NC
Zambesi Black D	C

FEBRUARY

Algol Scarlet G Powder	NC
Alizarine Cyclamine R Paste	NC
Alizarine Viridine (soluble in oil)	NC
Anthra Bordeaux R Paste	NC
Basic Blue GO	NC
Benzo Fast Black L	C
Benzoform Blue G Extra	NC
Benzo Fast Brown RL	C
Benzo Fast Heliotrope 5RH	NC
Benzo Fast Scarlet 8BS	C
Benzo Rhoduline Red 3B	NC
Brilliant Benzo Fast Yellow GL	NC
Chloramine Violet R	NC
Chlorantine Fast Bordeaux 2BL	NC
Chlorantine Fast Yellow 4GL	C
Ciba Pink BG Paste	NC
Ciba Red R Paste	NC
Croceine Scarlet 10B	NC
Diazo Brilliant Blue 2BL Extra	NC
Diazo Brown BW	NC
Diaminogene Blue NA	C
Fast Sulphon Violet 5BS	NC
Helio Red RMT Extra Powder	NC
Kiton Fast Green V	C
Modern Green N	NC
Neolan Yellow GR	NC
Rosanthrene B	NC
Vat Brown 2G Paste	NC
Vat Printing Brown R Paste	NC
Xylene Fast Blue FF Conc	NC

MARCH

Acridine Red PS	NC
Brilliant Acridine Orange A	NC
Brilliant Chrome Violet 3R	NC
Brilliant Sky Blue 8G Extra	NC
Chromacetine Blue S Extra	NC
Chromanol Black RVI	NC
Chromanol Blue NR	NC
Chromazurine G	NC
Chrome Orange R	NC
Chrome Printing Claret R	NC
Chromorhodine BN	NC
Diazo Brown SW	NC
Gallazine No. 90	NC
Indocyanine B	NC
Milling Orange G	NC
Modern Cyanine V	NC
Modern Violet	NC
Patent Phosphine RRDX	C
Vat Orange R Paste	NC
Vat Orange RRTS Powder	C
Wool Fast Orange G Powder	NC

APRIL

Acridine Flavine R	NC
Basic Blue GO	NC
Brilliant Sulphon Red B	C
Chloramine Red B	C
Chlorantine Fast Bordeaux 2BL	NC
Chlorantine Fast Brown 3RL	C
Cibanone Blue GCD Double Paste	C
Cibanone Orange 6R Paste	C
Ciba Black G Powder	NC
Ciba Black R Powder	NC
Ciba Red 3B Powder	NC
Diazamine Blue BR Conc	C
Indigosol Black TB Powder	NC
Lanasol Orange 2R	NC
Metachrome Blue Black 2BX	NC
Neolan Pink B	NC
Neolan Pink G	NC
Neolan Yellow G	NC
Tannoflavine F	C
Trisulphon Brown GG Conc	C
Xylene Milling Blue GL Conc	NC
Xylene Milling Red B Conc	NC

MAY

Acridine Red PS	NC
Blue 1900 TCD	NC
Brilliant Sulphon Red 10B	NC

Chinolene Yellow Conc	C	Modern Violet	NC
Chloramine Red 3B	C	Trisulphon Brown B Conc	C
Chromacetine Blue S Extra	NC	Xylene Milling Blue GL Conc	NC
Chromazurine G	NC	Xylene Milling Red B Conc	NC
Chrome Orange R	NC		
Chromorhodine BR	NC	**JUNE**	
Chromophenine FKN	NC		
Metachrome Blue Black 2BX	NC	Diazo Brilliant Scarlet B Extra	C
Modern Blue CVI	NC	Diazo Brilliant Scarlet S4B	C

The Tariff Commission has had several requests for figures showing the comparison of production and sales with the imports of dyes, grouped according to the method of application. The following table contains such information and is based on the final figures for the year 1925.

PRODUCTION, SALES AND IMPORTS OF DYES BY CLASSES FOR 1925

	DOMESTIC					
	SALES		PRODUCTION		IMPORTS	
CLASS—	Pounds	Value	Pounds	% of Total	Pounds	% of Total
Acid	10,356,726	$8,376,020	10,214,024	11.80	589,959	11.32
Basic	3,973,526	3,720,581	4,121,735	4.80	607,637	11.66
Direct	15,058,071	9,309,345	14,787,840	17.10	759,024	14.57
Lake and spirit soluble	1,532,793	1,468,976	1,606,795	1.90	57,540	1.10
Mordant and chrome	2,694,876	1,990,468	2,543,292	2.90	642,098	12.33
Sulphur	18,453,834	4,171,590	20,760,512	24.10	122,230	2.35
Vats (including Indigo)	26,702,741	7,105,849	31,730,178	36.70	2,418,842	46.43
Vats (a) Indigo	24,449,938	3,805,518	29,121,817	33.70	1,952	0.04
(b) Other vats	2,252,803	3,300,331	2,608,361	3.00	2,416,890	46.39
Unclassified and special	530,884	1,325,503	581,162	0.70	12,271	0.24
Total	79,303,451	37,468,332	86,345,438	100.00	5,209,601	100.00

U. S. EXPORTS OF DYEING AND TANNING EXTRACTS FOR MAY

Domestic exports of dyeing and tanning extracts during the month of May, the latest for which figures are available, were as follows: Logwood extract, 90,034 pounds, valued at $10,777; other dye extracts, 44,839 pounds, valued at $6,817; crude dyeing and tanning materials, 65 tons, valued at $3,900; Chestnut, 486,480 pounds, valued at $12,112; other tanning extracts, vegetable and chemical, 993,329 pounds, valued at $91,692. The United Kingdom, Canada and Japan took the bulk of our logwood.

DYE IMPORTS DECREASE IN JAPAN

The import of dyestuffs and chemicals into Japan under the restriction regulations showed a decrease during May as compared with April. In the month the department of commerce and industry granted permissions for 205,603 kilograms of dyes, valued at 944,178 yen, which, as against the report on the previous month, represents a decrease of 68,333 kilograms in weight and 222,153 yen in value.

Intermediate materials, photographic chemicals, artificial musk and others were permitted to the extent of 31,668 kilograms and 88,136 yen, showing a decrease of 136,723 kilograms and 119,570 yen. This is explained as due to the revised tariff put in force, which increased import perceptibly prior to March.

Quietness rules for all classes of dyes after active movements in March and April, before and after the enforcement of the revised tariff. The periodical slackness is emphasied more than usual.

GENERAL DYESTUFF ISSUES ACETATE SILK FOLDER

A very handsomely prepared folder showing dyestuffs for acetate silk and for mixed fabrics composed of cotton and acetate silk and of rayon, acetate silk and silk, in two and three color effects, has been distributed to the trade by the General Dyestuff Corporation. Altogether seventy swatches are exhibited. The first panel shows twenty-two different shades on pure acetate silk; the second and third panels forty-five shades in substantive dyes which do not stain acetate silk in mixed fabrics; the last two panels contain swatches showing, first, two-color effects on fabrics of cotton and acetate silk or rayon and acetate silk; second, solid shades on mixed fabrics composed of the same materials, and third, three-color effects, the designs in all cases being very striking and harmonious in color combinations.

The text of the folder explains the methods used in securing each effect, lists the dyes employed and gives the percentages for each swatch. The folder should be a most useful addition to the shade card file of acetate silk dyers.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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THE FUTURE OF THE DYEING ART

IT is indeed strange and paradoxical that man can employ a process successfully for many years before he thoroughly understands the scientific principles back of that process. Until comparatively recent times dyeing was more of an art than a science, and even to-day there is much about the process which we do not clearly understand. Science appears often centuries after the art to explain and systematize the achievements of the art, as Herrmann observed in his paper on "The Science of Dyeing." Hence the existence of several conflicting theories, such as the mechanical, the chemical and the colloidal, to explain the dyeing process.

One is naturally led to ask how we hope ever to progress along the unknown road ahead of us when we know so little concerning the place where we now stand. We have been moving rapidly forward along a way made smooth by established scientific principles underlying the process of applying colors to textiles. But the fact is that further advances in the art of dyeing—as radically new dyeing methods, new combinations of dye and fiber, new colors of hitherto unheard-of chemical constitution—will not be made unless new basic theories are set up and laws evolved from them. In our haste to apply the principles already known, we neglect and overlook the great importance of determining additional *fundamental* principles explaining the science of dyeing and its relation to the technology of dyes and of fibers. British investigators in these fields seem to have amassed a larger, more extensive body of definite data than we in this country. Apparently we do not keep before us the inexorable truth that the discovery of natural laws and principles must precede all invention.

In other words, the prevailing theories of the nature of the dyeing process as well as our knowledge of fiber technology and fundamental textile chemistry constitute the "raw material" from which grew, step by step, our present achievements in dyeing. Further contributions to the art of textile coloring will thus depend on a continued supply of such "raw material" in the form of more data on the laws that govern the process. To the pure science research worker we must look for future improvements in the art of dyeing. Although the industrial chemist plays a vital part in the discovery of new manufacturing and processing methods, he usually only applies what is discovered in the scientist's laboratory; such was the application of the hydrogen ion theory to textile chemistry. Both the solution of existing problems of dyeing and the invention of entirely new processes therefore depend very largely on our continuing to search for the fundamental scientific laws that form the foundation of the dyeing process.

THE SUN ON THE TEXTILE HORIZON

UNFORTUNATELY for the industries which depend for their welfare on the condition of the textile trade, the depression in wool and cotton manufactures is reported as unrelieved. Domestic consumption of cotton in May was 70,000 bales less than in May, 1925. There has been further curtailment of production by both Southern and Northern mills, and the indication is that more definite control of output will be the result of the present situation. Wool and silk textiles are likewise regarded as unsatisfactory in that the relation of demand to output is not as healthy as it might be. These conditions will naturally exert an undesirable influence on the consumption of dyes and textile chemicals. Purchases of these commodities are reported to be along routine lines, with generally slight price changes.

General business reports, on the other hand, are quite encouraging. Although the steel industry has slowed down more than usual, the activity in the electrical industries, the large consumption of domestic copper and the firmness of the heavy chemical market are cited as being indicative of stability, and as pointing forward to a very satisfactory volume of business during the second half of the year. Most encouraging of all signs is the fact that freight carloadings from January to June exceeded all previous records for a first half year.

While it is offering but scant encouragement to assert that the present tone of the textile industry cannot continue, that textiles are a basic and very necessary commodity and that therefore any dulness must be temporary and short-lived, yet we must agree that the remarkable solidity of business in general holds decided promise for the revival of textiles—and that certainly not in the far distant future, judging from recent events.

One cannot be other than optimistic on this point in view of the organization on July 21, after prolonged planning, of the Cotton Textile Institute, the object of which, according to its constitution, "shall be to

promote the progress and development of the cotton industry"; keeping in mind, also, the prospects of a similar movement in the wool trade, in the form of a Wool Council of America, composed of representatives from the leading woolen associations.

These steps are surely indicative of the dawn of a new era in the American textile industry, wherein production shall be governed by consumption, with the result that normal business at a fair profit will be the rule, instead of the exception, as has been the case during recent years.

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

MAKING GOOD ON A NEW JOB

By NOEL D. WHITE

Davenport Hosiery Mills, Chattanooga, Tenn.

One summer day during a slack season in Paterson, N. J., I was sitting with a bunch of dyers in a place where we used to congregate, talking "shop" and the news of the day, when a gentleman from a town in central New York blew in looking for a dyer to go to work for him in his home town, about 200 miles from Paterson. This man was well known in those days and had come to this place in the past, whenever he needed help for his dyehouse.

A friend of mine was selected to take the job, but as he was not of a roaming disposition and not wishing to go so far from home to a strange place, asked me if I would go with him if he got me a job there, too. I said I should be glad to go. But the man wanted only one dyer and would not consent to take me except as a helper or a skein finisher. This being my first chance to get out of the city I agreed to go as finisher, and the next day saw us on an Erie train bound for the West from which I was not to return for about ten years.

On the train we started talking about my experience in the dyehouse, and when we arrived at our destination, instead of putting me to work in the finishing room, he put me in charge of the tin loading department.

In this place they were doing the dyeing for a big ribbon mill, making all kinds of ribbons: Plain, from No. 1 to No. 80, dyed in the piece; striped and checked, skein dyed; also fancy and printed ribbons. Some were dyed in the piece and discharged afterward with polka dots and other designs. Others were dyed in skeins with dischargeable colors in different shades and a pattern discharged afterward.

It was a large plant and the variety of the work appealed to me, and I made up my mind it was a great chance for me to get an education in the work I loved so well.

My job was to load the silk which went into the fancy skein dyed ribbons. The gentleman who had hired us was manager of the dyeing and printing departments and already had a loading plant, but he told us that it was very hard to get the colors, even in dyeing the weighted silk.

They had to load in 100-pound lots. When loaded the lot had to be dried and kept in stock to be dyed in several colors as ordered from the mill. Orders came in every morning for the shades wanted, and they were for from 5 pounds to 50 pounds or more to the shade.

Sometimes we would use up a loaded lot without drying any, but as that seldom happened the rule was that a lot coming from the loading room was to go in the drying room and be stored away.

The way he used to load his silk was the reason for his uneven dyeing. He had in this room three lead-lined vats, one for the bichloride of tin, one for the silicate bath and the third one for the phosphate. The last two were heated with a closed lead steam pipe in a coil at the bottom of the vat, and three other vats were lined with canvas with an open copper pipe for steam. In a corner of the room there was an extractor with the basket lined with rubber to be used for the goods that came out of the tin bath.

This is how he did the loading: One pass in the tin bath, turned three times in one hour, wrung out, whizzed and washed in three changes of water, whizzed and passed in the phosphate bath for one hour, turned five times; washed and whizzed, then passed in the silicate bath for one hour, washed and whizzed and then the three operations were repeated, after which the goods were soaped at the boil, rinsed, dried and stored away for further orders.

As I had followed the loading of silk with the tin phosphate process for a number of years, I knew as soon as I saw how he did it, why his subsequent dyeings were uneven.

In the first place, the silicate bath between the first and the second pass in the tin was not only useless but positively harmful. When I investigated his baths I was amazed to find that he still had the first silicate bath he had started years before. Also his first phosphate bath, which would not have been so bad had he taken care to clarify it once in a while, which he never did.

When I took charge of that room I told the old gentle-

man I could not possibly use those two baths and was going to empty those vats and make two fresh, clean baths to use with my first lot, but he forbade me to do that.

I told him they both were utterly unfit for use, the silicate was so muddy and thick it stood at 25 deg. Tw.; that I considered it a crime to put a lot of good silk in that bath and that it could not possibly do the work for which it was intended. But he refused to be convinced. He said I could not fatten a hog without feeding him a lot of food. He had two new vats put up for my new baths.

I must say that there was no hard feeling over this. I was trying to show him I wanted to do good work and he wanted to show me his way of doing it was as good as any. If his weighted silk was not coming out even it was the fault of the dyer and the dyestuff.

The first lot I loaded was 100 pounds of three-thread tram, 24 ounces. I did it with three passes in tin and phosphate and one pass in silicate, the last bath before the final washing.

There were four dyers in this place. One had charge of all the dyed-in-the-piece ribbons. One had all the blacks, skeins and piece dyed. One had all the color skein work, both cotton and silk. As there was a lot of this work they had hired my friend to come up here and help him. He got the job to dye my weighted silk. He did it and the result was satisfactory. But we compared figures and aside from the fact that I had saved one operation and dyeing had come out even he said results were identical!

My next job was to weight a lot of silk in the "supple." Every silk dyer knows what supple silk is. For those who may not know I will explain that it means that the silk must be dyed without removing the gum, as is done in boiling off, and the thread made soft (supple) by boiling in a bath of cream of tartar or tartaric acid until the desired softness is obtained, and after being dyed and dried the softening is regulated in the finishing room by experts either on a string machine or by hand on a wooden peg with a wooden pin.

I was given a lot of white, three-thread, Japan silk. I soaped it at about 100 deg. Fahr. to clean it, softened it by boiling it in a bath of tartaric acid and loaded it in two passes of tin and phosphate and one in silicate. Just before I was ready to deliver my lot to be dyed the manager came to my room and told me how worried he was about my lot. He said this was the first time they had weighted supple silk with tin; that up to this time all supples had been weighted with glucose, that it was at my suggestion that he had consented to let me load a lot and that now the old dyer had announced that he was afraid of handling my loaded silk; that John, my friend, was busy with a number of hombrees lots and said he would be busy with them for the next two weeks; that the mill was waiting for the supple tram to keep the looms going and he did not know how to get it done.

I told him there was nothing to be alarmed over, and for him to give me samples and I would go in the dyehouse and dye this silk myself.

"Can you do it?" he asked.

"Can I do it? I have done nothing else for the last ten years."

"Well, then, here are the samples. Go in there and show them."

I proceeded to the dyehouse with my lot, my samples, one of my men, a lot of pride, full of enthusiasm and busted two buttons off my vest on the way.

Before the end of the second day the last of those colors was in the drying room. That night the old dyer asked for a vacation. He got it and never came back.

I was put in charge of the skein dyehouse. My friend got sore because I was given the preference and left the place. Nobody cared.

THE CONSTITUTION OF WOOL

(*Continued from page* 471)

the amino acid theory of protein constitution. It is of particular interest to us in that this work includes keratin. S. heated carefully dried casein, serum albumin, fibroin, gelatin and Witt's peptone with glycerol at 180 to 190 deg. Cent. This treatment hydrolyzes or depolymerizes these porteins into a mixture of the anhydrides of the simple amino acids. In exactly the same manner human hair, wool, feathers, tortoise shell and horn, all composed of keratin, are depolymerized, except that they require a little more glycerol and longer heating.

The conversion of these amino acid anhydrides into protein-like substances was accomplished by S. in a similar manner; that is, by heating them with glycerol. For instance, glyceryltyrosine anhydride gives a product showing the Millon and xanthoproteic acid reactions. The free amino acids behave in a similar manner, since they are converted into anhydrides under the conditions of the above experiments. Asparagine yields an amorphous powder giving a colloidal solution which shows the carbonyl and biuret reactions. Asparagine with tyrosine gives a product showing the Millon test, and with cystine a product showing the lead sulphide test.

(This is the fourth of a series of articles on wool by Charles E. Mullin. The fifth will appear in an early issue.)

John Goode, Jr., of the Modern Central Silk Dyeing & Finishing Company, of Paterson, N. J., is now in Los Angeles, Calif., where during a five weeks' period he will make a survey of the industrial field and also take a short vacation. The survey of local business conditions is to determine the advisability of opening a branch of his firm in Los Angeles.

The Reduction Products of Azo Dyes

Part XVII

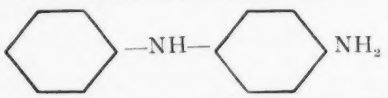
By WALTER C. HOLMES

Color Laboratory, Bureau of Chemistry

[EDITOR'S NOTE.—*The most practical and effective method for the identification of azo dyes consists in the isolation and identification of the products which they yield on reduction. This method finds less application than it might or should, partly because some of these products have never been isolated and investigated, and partly because much of the data which has been obtained in regard to such reduction products is greatly scattered and very difficult to locate.*

Mr. Holmes has made a search for all the available information on such reduction products, and this series contains a digest of his results with a systematic listing of the reduction products of the azo dyes published in the Colour Index, together with the available data on such properties and reactions as would be of service in their identification.]

No. 205.—4-AMINODIPHENYLAMINE



$C_{12}H_{12}N_2$; Mol. Wt. 184.17; (C, 78.2%; H, 6.6%; N, 15.2%).

Derived from C. I. Nos. 138, 143, 162 and 217.

Flat prisms from ligroin or gasoline which melt at 75°, or silky needles from alc. which melt at 66°, but after fusion and resolidification then melt at 75°. Under one atmosphere of hydrogen it boils at 354°. Sl. sol. in H_2O, readily sol. in abs. alc. or ether.

Sols. of the salts give a red color with dil. $FeCl_3$, soon turning green, and, at greater conc., a green pptte, which dissolves in H_2SO_4 with a carmine-red color.

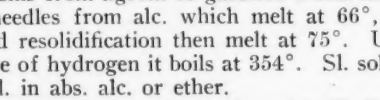
The *sulfate* cryst. in fine glittering white sp. sol. leaflets and gives a diazo salt with HNO_2, leaflets, very diffic. sol. in H_2O.

The free base gives an insol. monochlorimide with alk. hypochlorite and an addition product with sym. trinitrobenzene, black plates, mpt. 105.5°.

Acetyl deriv., ruby-red needles, mpt. 238°.

On oxidation in acid aq. sol. with H_2O_2 and a trace of $FeSO_4$ it yields a voluminous indigo-blue pptte. (Willstatter's imide).

No. 206.—4, 4'-DIAMINODIPHENYL (Benzidine)



$C_{12}H_{12}N_2$; Mol. Wt. 184.17; (C, 78.2%; H, 6.6%; N, 15.2%).

Derived from C. I. Nos. 367 to 429, 488, 546 to 561, 581 to 602, 610 to 614, 633 and 653.

Large colorless silky plates or white leaflets. Mpt. 127.5-8°. Bpt. 400-1° at 740 mm. Sol. in about 2,500 parts H_2O at 12° or about 106 parts boiling H_2O, and in 45 parts ether. Readily sol. in alc.

Salts; Hydrochloride, thin rhombic plates, readily sol.; *Sulfate*, small shining scales, only sl. sol. in hot H_2O and alc.; *chromate*, characteristic deep blue needles; *1, 8-dinitronaphthalene-3, 6-disulfonate*, light yellow prisms, mpt. 275° (decomp.) sol. in 2,777 parts H_2O at 20°; *chromotropate*, brown prisms, mpt. 278° Cent. sol. in 1,177 parts H_2O at room temp. For other benzene and naphthalene sulfonates see J. Soc. Chem. Ind. *43*, 165, 299, 341 (1924).

Additive comp.—with *acetoacetic ester*, yellow leaflets, mpt. 128°, colored intense green by $FeCl_3$; *m-dinitrobenzene*, black cryst., mpt. 128°; *sym. trinitroethylbenzene*, black prisms (alc.) mpt. 73°; *1, 3, 6, 8-tetranitronaphthalene*, black prisms (xylene), mpt. 194°; *N-methylpyridinum iodide*, yellow needles, mpt. 154°, unstable in hot H_2O.

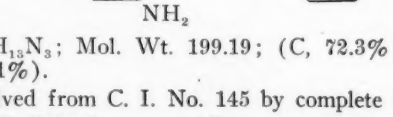
With bromonitro-styrene *dibenzylidene benzidine* is obtained, plates (C_6H_6), mpt. 231-2°.

Diazotized and coupled with: *β-naphthol*, dark cryst. pdr. with green reflex (toluene), mpt. 302°, blue sol. in H_2SO_4, blue-violet pptte, on dil.; *Naphthol AS*, dark violet cryst. pdr. mpt. over 320°, blue sol. in H_2SO_4, blue-violet pptte. on dil.

Monoacetyl deriv., long needles (alc.), mpt. 199°; *diacetyl deriv.*, mpt. reported variously as 315°, 317° and 330-1°; *triacetyl deriv.*, mpt. 215-6°; *tetraacetyl deriv.*, long silky needles, mpt. 214-5° (also reported as 176°); *4-nitroso-4'-acetyl deriv.*, yellow-brown feathery needles which darken at 200° and are completely melted at 275°; *benzoyl deriv.*, cryst. (alc.), mpt. 203-5°; dibenzoyl deriv., prisms (phenol), mpt. 352°.

Dilute aq. sols. of benzidine give heavy deep blue pptte. with pot. bichromate or ferricyanide. On adding dil. bromine water to a sol. of benzidine in CS_2 the aq. layer is colored deep blue and then deep green; with further addition of bromine the aq. layer becomes colorless and the CS_2 is colored deep red.

No. 207.—2, 4-DIAMINODIPHENYLAMINE



$C_{12}H_{13}N_3$; Mol. Wt. 199.19; (C, 72.3%; H, 6.6%; N, 21.1%).

Derived from C. I. No. 145 by complete reduction.

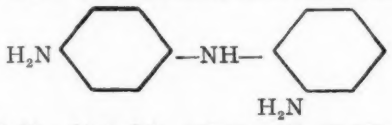
Small light brown needles, mpt. 130°. Gives well cryst. diacid salts, less stable in air than the free base.

Dyacetyl deriv., fine colorless needles, mpt. 188°.

The base yields an oxidation product ($C_{12}H_{10}N_2O$) on heating with MnO_2 and NH_3 which is insol. in alkalies, cryst. from benzene in yellow-brown leaflets, mpt. 152°. By condens. with acenaphthenquinone *2-amino-phenylacenaphtho-phenazonium chloride* may be obtained, dark violet needles, sol. in hot alc. and H_2O with a Bordeaux-red color and in H_2SO_4 with a red brown color, turn-

ing red on dilution. Its acetyl deriv. cryst. in long red needles, sol. in alc. and H_2O with an orange color and a weak green fluorescence.

No. 208.—2, 4'-DIAMINODIPHENYLAMINE



$C_{12}H_{13}N_3$; Mol. Wt. 199.19; (C, 72.3%; H, 6.6%; N, 21.1%).

Derived from C. I. No. 145 by complete reduction.

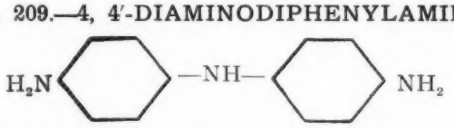
Colorless oil. The hydrochloride may be obtained in a crude condition by the action of HCl gas on the base, in the form of long prisms which soon turn dark (violet) in the air. With $FeCl_3$ it gives a green color, turning purple.

The *diacetyl deriv.* cryst. in slightly reddish needles mpt. 203°.

By heating with the diacetyl deriv. with HCl a pure hydrochloride is obtained which is stable in air and gives no color test with $FeCl_3$. With $PtCl_4$ it forms a double salt, yellow needles.

By oxidation with bichromate an *aminophenazine* is obtained, dark brown cryst., which melt at 265-8° and may be sublimed.

No. 209.—4, 4'-DIAMINODIPHENYLAMINE



$C_{12}H_{12}N_3$; Mol. Wt. 199.19; (C, 72.3%; H, 6.6%; N, 21.1%).

Derived from C. I. Nos. 145, 544 and 545.

Leaflets (H_2O), mpt. 158°. Aq. sols. are colored intense green by $FeCl_3$.

Sulfate, long needles, sp. sol. in H_2O. Suspended in H_2O it gives the diazo sulfate with HNO_2, pptted. by alc. and ether, with HCl and $PtCl_4$ it yields golden yellow hair-like needles of the double salt of the diazo chloride.

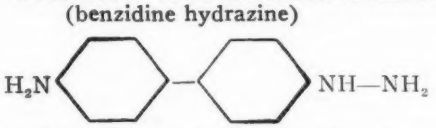
Monoacetyl deriv., leaflets which turn reddish gradually, mpt. 178°. Dissolved in HCl it gives an intense red-violet color with $FeCl_3$ and a dark red-brown color, turning brown and, finally, yellow with $NaNO_2$.

Diacetyl deriv., needles, mpt. 239°, readily sol. in alc. and Ac HO.

The amine gives an addition product with *m-dinitrobenzene*, violet cryst. (alc.) mpt. 91-2°.

Its salts are oxidized by bichromate with the formation of a blue indamine dye. Further oxidation in the presence of aniline yields phenosafranine, and in the presence of acetylphenylenediamine yields acetylaminosafranine (Abs. max., 536 mu).

No. 210.—4-AMINO-4'-HYDRAZINODIPHENYL (benzidine hydrazine)

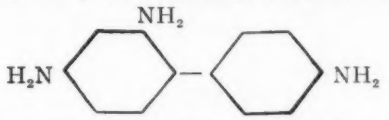


$C_{12}H_{13}N_3$; Mol. Wt. 199.19; (C, 72.3%; H, 6.6%; N, 21.1%).

Derived from C. I. No. 109 by partial reduction.

Apparently no data are available.

No. 211.—2, 4, 4'-TRIAMINODIPHENYL



$C_{12}H_{13}N_3$; Mol. Wt. 199.19; (C, 72.3%; H, 6.6%; N, 21.1%).

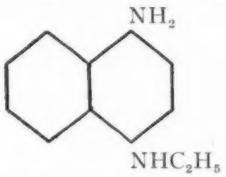
Derived from C. I. Nos. 431, 432 and 433 by complete reduction.

Long colorless needles, mpt. 134°. Hydrochloride (3HCl), white crystals.

On heating with S in alc. the base yields a S deriv., mpt. 190°.

If an excess of NaOH is added to an aq. sol. of the hydrochloride the precipitated base goes into sol. on passing in CO_2 (probable formation of a carbaminic acid).

No. 212.—4-ETHYLAMINO-1-NAPHTHYLAMINE



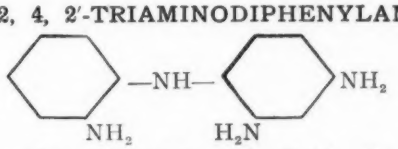
$C_{12}H_{14}N_2$; Mol. Wt. 186.17; (C, 77.4%; H, 7.6%; N, 15.0%).

Derived from C. I. Nos. 207 and 296.

According to Koch the base is a yellowish product which turns dirty green and then black on drying. The hydrochloride cryst. in rose colored leaflets which melt at 152°. The picrate cryst. in small red-brown needles, mpt. 180°, diffic. sol. in H_2O and alc. The base yields α-naphthoquinone, mpt. 125° on oxidation with chromic acid.

According to Bamberger the base is an oil, sl. sol. in H_2O and readily sol. in org. solvents. Its sols. are darkened quickly by light and air. It gives a weak brown color with $FeCl_3$. With bichromate and m-tolylendiamine it gives a blue-green color which turns red on heating. The hydrochloride is described as a silvery white cryst. pdr. which turns greenish in air, readily sol. in H_2O and diffic. sol. in HCl. Its melting pt. is given as 193°.

No. 213.—2, 4, 2'-TRIAMINODIPHENYLAMINE

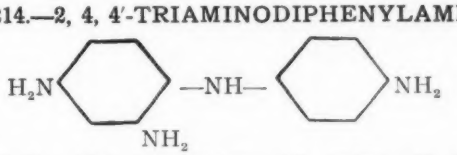


$C_{12}H_{14}N_4$; Mol. Wt. 214.20; (C, 67.3%; H, 6.6%; N, 26.2%).

Derived from C. I. No. 146 by complete reduction.

Apparently no data are available.

No. 214.—2, 4, 4'-TRIAMINODIPHENYLAMINE



$C_{12}H_{14}N_4$; Mol. Wt. 214.20; (C, 67.3%; H, 6.6%; N, 26.2%).

Derived from C. I. Nos. 146 and 147 by complete reduction.

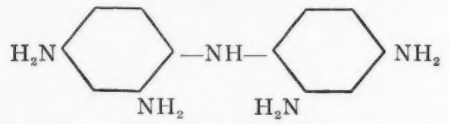
No description of the base or of its salts was found

in the literature. Certain reactions given by the hydrochloride are recorded, however.

By oxidation with bichromate in the presence of aniline it yields *p-aminophenosafranine.*

By treatment with benzaldehyde *tribenzilidine-triaminodiphenylamine* is obtained, yellow flocks, insol. in H_2O but sol. in acids without decomp. and readily sol. in org. solvents. (The N content is 11.7%). On warming with 15% HCl this yields a second base (losing benzaldehyde) which melts to a brown syrup at 122-4°.

No. 215.—2, 2', 4, 4'-TETRAMINODIPHENYLAMINE

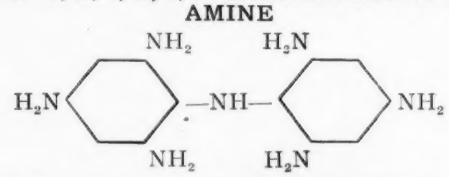


$C_{12}H_{15}N_5$; Mol. Wt. 229.22; (C, 62.9%; H, 6.6%; N, 30.6%).

Derived from C. I. No. 146 by complete reduction.

Apparently no data are available.

No. 216.—2, 2', 4, 4', 6, 6'-HEXAMINODIPHENYLAMINE

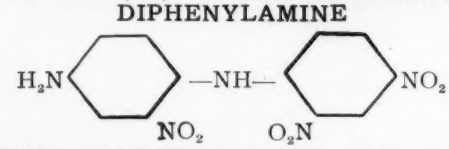


$C_{12}H_{17}N_7$; Mol. Wt. 259.25; (C, 55.6%; H, 6.6%; N, 37.8%).

Derived from C. I. No. 12.

Apparently no data are available.

No. 217.—2, 2', 4'-TRINITRO-4-AMINODIPHENYLAMINE



$C_{12}H_9N_5O_6$; Mol. Wt. 319.17; (C, 45.1%; H, 2.8%; N, 21.9%; O, 30.1%).

Derived from C. I. No. 146 by incomplete reduction.

Apparently no data are available.

DRY-CLEANING RAYON

In the AMERICAN DYESTUFF REPORTER of June 14, page 397, a washroom formula and procedure was given that could be used satisfactorily on fabrics containing rayon and other synthetic fibers. This washing procedure was developed by the National Association of Cotton Manufacturers in collaboration with the Pilgrim Laundry and the Cotton Research Company.

As all fabrics or garments are not adaptable to laundering the Technical Department of the National Cotton Manufacturers Association continued its investigation and ran a series of experiments on the dry cleaning of fabrics containing rayon.

Samples made with cotton warp and Tubize, Viscose and Celanese filling were obtained and dry-cleaned at one of the largest commercial dry-cleaning establishments in this vicinity. Width, count, weight and strength were obtained for each sample before dry cleaning and after 1, 2 and 3 dry cleanings. While there was a slight change in some of the fabrics the changes were so small that they might easily have been due to variation in the individual samples and it was concluded from the data obtained that dry-cleaning, if properly carried out, had no appreciable effect on any of the common synthetic fibers.

Table I gives the detailed determinations for the width, count, weight and strength for each step in the investigation.

Table II gives the details of the dry-cleaning process that these fabrics were subjected to.

TABLE I

RESULTS OF TESTS OF SEVERAL COTTON AND RAYON FABRICS SUBJECTED TO DRY-CLEANING TEST

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Width, inches:					
Original	36⅞	35½	35	36	34/35
1 dip	36¾	35⅜	35	..	.....
2 dips	36½	35⅜	35	..	.....
3 dips	36½	35⅛	35	35⅞	34/34½
Thread count:					
Original	75.0x72.2	48.2x51.6	62.0x57.2	82.4x69.2	46.0x43.2
1 dip	74.8x72.2	49.0x53.4	61.8x55.8	.....	.....
2 dips	75.2x72.4	49.0x52.5	61.5x55.5	.....	.....
3 dips	74.5x71.7	48.9x52.2	61.7x55.6	82.5x69.6	45.2x43.2
Weight, oz. per sq. yd.:					
Original	3.77	2.59	2.05	3.41	1.94
1 dip	3.69	2.59	2.07	....	....
2 dips	3.71	2.57	2.04	....	....
3 dips	3.63	2.61	2.05	3.41	1.93
Strength, lbs.:					
Original	76.0x48.0	51.5x34.2	37.2x33.2	49.3x48.0	18.2x17.8
1 dip	65.8x41.7	51.0x36.0	30.3x34.0	.....	.....
2 dips	71.2x49.3	51.7x36.0	27.8x34.7	.....	.....
3 dips	74.8x49.5	50.7x37.2	29.3x34.8	47.3x49.7	16.5x16.5

TABLE II

The fabrics were dipped in a solution of 20 per cent ammonia soap and naphtha. The soap and naphtha solution was made from oleic acid and naphtha.

The specifications for the solvent carry the following requirements:

1. The solvent shall be free from undissolved water and suspended matter.

2. Color: The color shall be water-white.

3. Doctor test: The doctor test shall be negative.

4. Unsaturated Hydrocarbons: Not more than 2 per cent of the naphtha shall be soluble in concentrated sulphuric acid.

5. Distillation Range: The temperature limits for the distillation are as follows:

The initial boiling-point shall not be less than 300 deg. Fahr.

The dry or end point shall be a temperature not greater than 400 deg. to 410 deg. Fahr.

6. Acidity: The residue remaining in the flask after distillation is completed shall not show an acid reaction.

7. Aromatic Hydrocarbons: The naphtha shall not contain aromatic hydrocarbons, such as benzene, toluene and others.

8. The odor shall be sweet.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XXIII

(*Continued from page 454*)

Two-side Topping—Construction and Features of the Plant—Its Operation and Advantages

By RAFFAELE SANSONE

THE plant described in Part XXII, although offering the advantages indicated, possesses the defect of not allowing in one passage a complete topping of the dyed cotton fabrics if these exceed a certain thickness, with which the penetration is less rapid and thorough on the front of the pieces. To avoid this, the material could be sprayed simultaneously on both sides by employing the somewhat modified plant indicated in Fig. 2.

Here is to be seen a light iron structure composed of the two side frames A and B, which support between them a shallow rectangular-shaped collection trough (J) having an inclined bottom leading to an exit tube of a certain size and indicated by t. Trough J is of sufficient size for surpassing the weft of the broadest pieces of cotton cloth on both sides of a few inches, and its length is such that it can also collect what topping bath is pressed out by the pair of squeezing rollers o. To observe how the topping bath is flowing off the cloth being treated and from the squeezing rollers o, the side walls of trough J are glass plates held together at the ends by copper receivers, forming a rectangle.

Below tube t can be placed the collection and distribution vat T, running on wheels and having at one side a tap and tube that can be rapidly joined to a short tube and tap on the centrifugal pump P by a copper screw juncture. Vat T is of iron, lined inside and outside with a sufficiently thick copper covering; but it is not heavy, nor are the four wheels fitted below its bottom excessively high, permitting an easy access to the interior. Several of such vats are supplied with the plant, permitting the preparation of new dye baths or the delivery of old baths during the continuous treatment of the cotton goods.

The interior of pump P is supplied with a double casing, through which steam can be circulated when it is necessary to maintain the spraying baths at a certain heat. The steam is led in in this instance through a small tap and all condensed water is eliminated by a small steam trap of special construction. Its upper portion is joined to a copper tube (c) having the central tap y and fixed to the lower and upper series of spraying tubes a and b, between which the cotton cloth (M) to be topped is caused to run, being held all through under the required tension between the pairs of squeezing rollers e and o.

The topping bath coming from tube c is distributed to the series of spraying tubes a and by by a tube forming a tee with it, and that is joined to four upper and four lower tubes, ending each in an independent spraying tube and each supplied with an independent tap. All spraying tubes, through a special junction arangement, can be taken off whenever required for cleaning or freeing their perforations. They contain three series of holes running across their full length. The upper spraying tubes b and lower spraying tubes a are parallel, and the distance of the first from the cloth kept under tension is exactly the same as that from the lower series of spraying tubes a.

To vary the treatment of the cotton cloth goods in accordance with their thickness or special construction, the revolutions of rollers e, o and r can be regulated to three speeds, each of which is set through the movement of a hand lever.

The driving of the plant is provided for in this instance

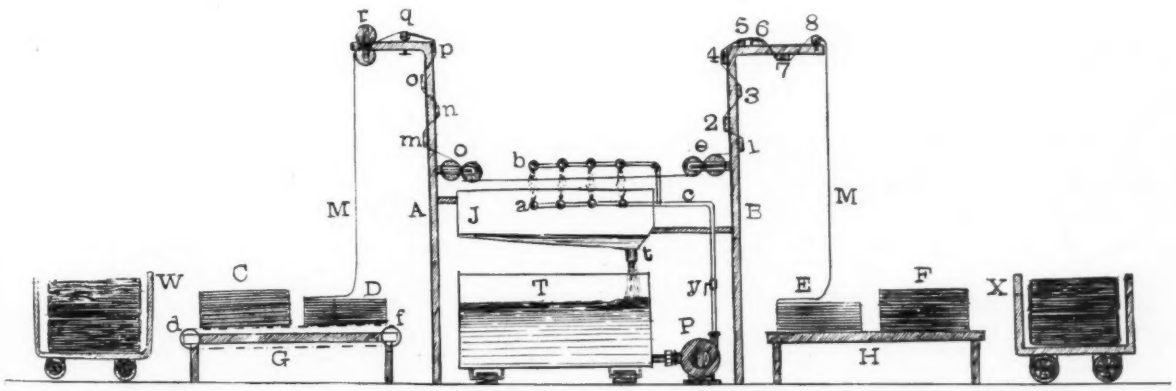


Fig. 2

by a single electric motor; but, if more convenient, it can also be driven by a fast and loose pulley driven from an upper or lower transmission by a gas engine, a steam engine, etc.

Squeeze rollers e have their axles turning in guides fitted to frame B, and the required pressure is applied on them through screw wheels, while rollers o are fixed in guides placed on frame A; and also in this instance the required pressure is applied through screw wheels. For guaranteeing the necessary elasticity in the two nips formed by the above rollers, their outer unit has a thick India-rubber covering. One of the axles of rollers e is connected with a yard measuring arrangement.

Frame B contains several lined copper bars, 1, 2, 3, 4, 6, 7, and the rollers 5 and 8, all for the entrance of the fabrics (M) as they are unfolded from the pieces E on the low wooden table H, which is of sufficient length for carrying other pieces (F). Rollers 5 and 8 are turned by the cloth itself. A small iron wagon or truck (X), running on wheels and rails, serves for the transportation and supply of the material to be topped, which is received from the department where the dyeing in the direct colors and following rinsing have been conducted without drying.

Frame A is supplied at its upper part with a pair of squeeze cylinders (a), from which the material is delivered onto table G. This is supplied with an endless band, turned and kept under a strong tension by the two end-rollers d and f. The movement of the endless band is in this case such that the cloth coming down in a straight condition is formed into the pieces D, which can later be placed in the position indicated by C, ready for withdrawing from the plant and entering in to a second truck (W), also running on wheels and rails.

Frame A is also supplied with the lined spreading bars m, n, o, p, and with an elastic tension regulating arrangement (q), supplied with a screw wheel and a spiral spring. The end shafts of rollers 5, 8 on frame B, of the pairs of squeeze rollers e and o above trough J, of the pair of squeeze rollers r on frame A, of the tension roller q, of all driving pulleys and of pump P are all carried in ball bearings, easily lubricated, without danger of staining the material in any way.

Operation of the Plant

To operate the above plant, the operatives, after having loaded on truck X a portion of the lot of pieces of cotton cloth dyed in the direct colors, push this to the end of the topping plant and enter half its contents onto table H to a point just below frame B and the other half at a few inches' distance on the same table. After this they again fill truck X, bringing it close to table H ready for unloading when necessary.

After similar preparatory operations, the topping bath to be used is prepared in one of the vats T from a concentrated solution, pushing this below the tube t and fitting its lower tube to pump P. When this has been accomplished, the operators sew to the beginning of the first piece to be topped two narrow cotton tapes, or in the absence of these two strong hemp strings, passing these rapidly on rollers and spreading bars 8, 7, 6, 5, 4, 3, 2, 1, between the pairs of squeeze rollers e and o, on bars m, n, o, p, on tension rollers q and between squeeze rollers r, taking care that they pull the cloth in quite a straight position, accomplishing this, if necessary, by loosening the pressure on squeeze rollers e, o and r; which is, however, again applied directly afterward.

When the above has been completed, the speed at which cloth is to be run during the topping operations is regulated, and the plant started just sufficiently to bring the first an inch or two beyond the squeeze rollers (e). After which pump P is also put in movement. In this way four long narrow upper and four long narrow lower sprays encounter each other, delivering a certain quantity of dye bath into trough J and through tube t again into the vat T that has been fixed below. Steam is then turned on to warm the dye liquor passing through the pump. Before starting the topping operations, the intensity of the spraying of the two series of tubes a and b is regulated by leaving open in full tap y or by closing this up to a certain degree and by turning the taps before the spraying tubes, thus avoiding an unnecessarily energetic action of the coloring bath and assuring a thorough utilization of the same.

The plant is then again started and left running continually to cause the cotton fabric to pass between the double series of spraying tubes a and b, where it is treated on both sides, with good penetration of the dye, especially after its passage through the squeeze rollers o. On leaving these, it is then brought upward onto the bars m, n, o, and p on frame A, passing later between rollers r and falling onto the endless moving band of table G, which forms it into pieces ready for carrying to the drying room, or rinsing plant if necessary.

During the running through of a certain yardage of cloth the topping bath is weakened and the operatives add a certain volume of the strong basic dyestuff solution, continuing this addition when necessary.

As the topped material leaves rollers r, the operatives watch it carefully to ascertain if the bath has penetrated to the desired degree and if both sides have been treated as required. Should it be observed that the material has not been sufficiently penetrated, the speed of the machine is reduced to bring down the number of yards of the dyed cotton cloth topped per minute, and if necessary the taps before the spraying tubes are turned on more.

When the pieces E are nearing their end, they are sewn onto the beginning of pieces F, which are then placed in the position of pieces E, entering on table H another lot of goods taken from truck X. In the meanwhile, on table G the lot of pieces formed is moved forward to position C and later from here to truck W, repeating the passage as soon as a pile of sufficient height has accumulated on the

end of table G, and when the truck is filled delivering its contents to the drying or rinsing department.

Advantages of the Plant

The above plant has several advantages, some of which can be indicated as follows:

1. The cotton cloth that has been dyed in suitable direct coloring matters can be topped all through, even if of considerable thickness, especially as the topping baths can be heated and made to penetrate better.

2. The topped cotton fabrics are kept continually under the same tension.

3. The rollers 5 and 8 on frame B assist the passing of the joined portions of the fabrics, which have later no difficulty, if properly made, in passing through the nips of squeeze rollers e and o and over frame A.

4. The same topping bath is employed over and over again until it reaches a point in which a strengthening is necessary, which is conducted in vat T itself, after the passage of a certain yardage of cloth.

5. The yardage of the cloth running through the machine is controlled exactly during the passage over the rollers e.

6. The thoroughness of the treatment is not only guaranteed by the amount of topping bath sprayed on both sides of the fabric, but also through the penetration action of the different spraying jets.

7. The dyed cotton cloth goods can be sprayed on both sides with only two, three, four, five, six, seven or eight spraying tubes, whereas the action of each spraying tube can be increased or reduced at will through the taps before it.

8. The operators cannot only observe all through the material but can also control the action of the topping liquors upon it.

9. The entrance in the plant of the cotton cloth dyed in the direct colors and its exit after the topping are completed with great rapidity, without requiring any intermediate stopping of the plant.

10. Should it be required, the plant can be employed either for wetting only the back or only the front of the material.

(Part XXIV will appear in an early issue.)

NEW GENERAL DYESTUFF PRODUCTS

Two leaflets issued by the General Dyestuff Corporation describe the properties of two new colors produced, respectively, by Farbenfrabriken vorm. Friedr. Bayer & Co. and by the I. G. Farbenindustrie Aktiengesellschaft, under the names Alizarine Sky Blue G and Indanthrene Scarlet R Paste fine.

Alizarine Sky Blue G, a new homogeneous dyestuff yielding a considerably greener tone than the old B brand, is as a rule dyed weakly acid; if applied on a chrome mordant by the afterchrome or monochrome method, somewhat greener and flatter shades are obtained. It is described as possessing good level dyeing and penetrating properties when dyed weakly acid and very good solubility. Even the acid-dyed shade, according to the announcement, is of good fastness to washing, while the afterchromed shade is said to be remarkable for its fairly good fastness to milling. It is also described as having good fastness to light and stoving. White cotton effects in woolens are not tinted, silk effect threads are but slightly stained. It is well suited for unweighted silk, but not so well adapted for weighted.

Indanthrene Scarlet R Paste fine is said to be particularly suited for calico printing. It may be used as a self-color for the production of deep scarlet shades as well as in conjunction with other suitable Indanthrene colors for mode shades. The fastness to light and washing, it is claimed, is very good; the fastness to chemicking excellent. It is best printed by the potash steaming process with an addition of Algosol. Dissolving Salt B or Solvenol. For padded styles either the steaming process or the developing process on the jigger may be adopted.

NOIL OFFERS NEW DIRECT BROWN

A leaflet just distributed by the Noil Chemical & Color Works, Inc., describes the properties of a new addition to this manufacturer's line of direct colors under the name of Noil Direct Brown G and GG. The G type is identical with the prewar Benzo Brown G. The GG brand is somewhat yellower in shade. These products are recommended for dyeing raw stock, yarn or piece goods because, the announcement states, they are level dyeing and possess fairly good fastness to acids and alkalies.

THE FRANKLIN RAYON DYEING COMPANY

The Franklin Rayon Dyeing Company, affiliated with the Franklin Process Company of Providence and Philadelphia, was incorporated on July 21 under the laws of the State of Rhode Island with the following officers: E. S. Graves, president; H. D. Evans, vice-president; W. A. Travers, treasurer; L. T. Brown, general manager; A. N. Dana, secretary.

This new corporation will engage in the commission dyeing of rayon in the wound form. A new method of dyeing will be used which has been perfected after considerable research work. This new method has a considerable advantage over skein dyeing in that it is said to leave the rayon in a much better condition and reduce winding costs.

The company will be located in the George E. Boyden plant, 86 Crary Street, Providence, which plant it has purchased and will remodel and re-equip. Operations will probably begin early in the fall.

Technical Notes from Foreign Sources

Printing White and Red Discharges on Indigo Grounds

An investigation was made on printing pastes containing lead chromate, manganese dioxide and sodium chlorate which were used for the purpose of obtaining white or colored discharges on Indigo dyed fabrics. During this investigation it was found that the manganese dioxide and the sodium chlorate were not essential for the production of colored discharges, and also that the white discharges could be obtained without the use of sodium chlorate and with a smaller proportion of manganese dioxide than is ordinarily employed.

In Bulletin Soc. Ind. Mulhouse, volume 91, pages 759-761, an example is cited in the case of red discharges which were obtained on cotton that had been dyed with indigo. The cotton is mercerized, prepared with the aid of beta-naphthol and then printed with a paste that contained 4.800 grams of lead chromate, 9,395 grams of gum tragacanth mixed with starch thickening, 6,575 grams of diazotized para nitraniline and 3,000 grams of water. Thereafter the cotton was passed through a solution of hydrochloric acid of 17 deg. Be. concentration (1.13 specific gravity) for a period of three to five seconds. The temperature of this solution was maintained at 37 deg. Cent. Then the cotton was steamed for thirty-five to forty seconds at a temperature of 35 deg. Cent. and finally washed.

It is also stated in this article that white discharges are obtained by means of a similar discharge paste containing 4,800 grams of lead chromate, 7,000 grams of gum tragacanth mixed with starch thickening, 3,000 grams of water and 600 grams of manganese dioxide. The treated fabrics are then cleared by soaping.

Affinity of Derivatives of Dehydrothiotoluidine and Primuline for Cotton

A cotton skein weighing 5 grams was boiled for one hour with 0.15 gram of dye and 100 c.c. of distilled water and the amount of dyestuff absorbed from the solution was determined. The skein was then rinsed and treated with 100 c.c. of boiling water and the dye stripped out estimated after twenty-four hours. The difference between these two values, expressed in percentage of the amount of the color originally taken, is proposed as an empirical measure of the affinity of the dye for cotton.

In the article on this subject published in Helvetica Chemica Acta, 1926, volume 9, pages 364 to 378, the affinity is estimated for a range of substances in the dehydrothiotoluidine and primuline classes. The affinity of the sodium salt of dehydrothiotoluidine-3-sulphonic acid is almost negligible, but it can be developed by the introduction into the molecule of suitable substituents such as nitro or amino groups. The affinity is markedly increased by the introduction of a second thiazole nucleus to give the corresponding primuline sulphonic acid.

In the azo derivatives of these compounds, however, the lower homologue shows, in the cases considered, the higher affinity, although the primuline colors are less easily stripped from the cotton. The choice of coupling components in the preparation of these derivatives has considerable influence on the affinity. The dehydrothiotoluidine and primuline azo colors, as a class, show small affinity compared with that of the bisazobenzidine colors.

When the dyeing process is carried out in the presence of sodium sulphate an increased affinity is obtained, notwithstanding the greater ease with which the dyestuff is thereafter stripped from the cotton skein. The degree of dispersity of the coloring matter in solution is considered to be an important factor in determining the affinity.

Carbonizing Piece Goods

Burs and vegetable impurities are successfully removed from woolen fabrics by carbonizing for a period of twenty to thirty minutes at a temperature of 71 deg. Cent. with 7.5 per cent sulphuric acid, and the resulting fabric can be dyed evenly provided that the fabric before carbonization is thoroughly freed from grease and soap and not allowed to lie more than twenty to thirty minutes after removal of the excess acid by mangling or hydroextraction. (Journal of the Society of Dyers and Colourists, 1926, volume 42, pages 109-110.)

Linen Finish on Cotton

British Patent No. 244,485 describes a process for obtaining a linen-like finish on cotton fabrics and yarns. Thus cotton yarns of less than 60's count and fabrics which are made from these yarns are given a permanent linen-like finish by treatment for not less than four minutes at a temperature of 0 to 5 deg. Cent. with sulphuric acid of 49 to 50 deg. Be. concentration (specific gravity 1.516 to 1.532). The cotton is subsequently well washed and mercerized under tension by means of 15 deg. Be. solution of sodium hydroxide at ordinary temperatures exceeding 0 deg. Cent.

Colors and Luster on Natural or Artificial Fibers

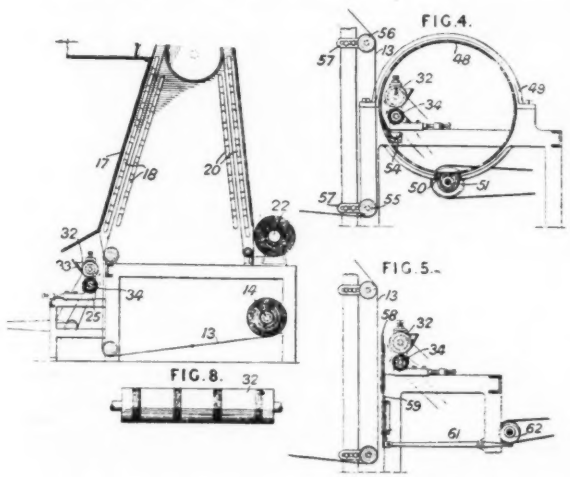
A precipitate of sulphur is produced locally on parts of the material, and dyeing is then carried out. The material may be dipped in a solution of alkali polysulphides and treated with acid, or soaked in a solution

of sulphur in an organic solvent with subsequent evaporation of the latter. The presence or the absence of sulphur on the fiber results in different tints on dyeing or treatment with metallic salts. For viscose silk the desulphurizing process is omitted. If the viscose silk is treated with desulphurizing agent after dyeing a non-lustrous fiber is obtained. For the production of patterns the sulphur is removed only in parts.

Printing on Fabrics

The illustration shows an apparatus, patented in British Patent No. 248,254 and used in the printing of textile fabrics. The textile fabric is shown at 13 in Fig. 1 and is printed by feeding it past an engraved roller 32, such as is shown in Fig. 8. This roller is supplied with a color paste which is removed from the roller and sprayed onto the fabric by means of a rotating brush 34, in cut. A stencil may be interposed between the spray and the fabric.

The web shown at 13 is unwound on the reel 22.



The inking apparatus and the stenciling device are as follows: Color is supplied to the roller 32 of cut by a trough 33, the lower edge of which acts as a scraper to remove the surface color from the roller. The spraying device 32..34 is carried on a frame 25 adjustable to and from the fabric 13, the roller 32 is mounted in adjustable bearings so that the pressure on the brush may be varied, and the roller and brush are rotated by independent belt drives so that the relative speeds may be varied to vary the decorative effect.

In the construction shown in Fig. 4 the spraying device 32..34 is arranged inside a perforated stencil drum 48 which rotates in a bearing 49 driven by the gears 50 and 51. Surplus color is removed from the drum by a drip pan 54, the edge of which forms a scraper. The web 13 passes over guide rollers 55, 56 mounted in brackets 57 so as to be adjustable to and from the spraying device.

Fig. 5 shows an alternate form comprising a flat stencil 58 in conjunction with which is arranged a shutter 59 for providing an intermittent spray, the shutter being reciprocated by an eccentric 62 and rocking level 61. In a further modification a battery of spraying devices is provided for multi-color printing. Also, the brush may be arranged above a roller 32 dipping in a trough.

Using Several Dyes in a Single Bath

There is considerable of practical interest in what takes place when several dyestuffs of different origin are employed in one and the same color liquor. For it often happens that a number of colors must be used together in order to obtain certain definite results. Thus, in obtaining a brown shade, three different colors, namely, red, yellow and blue, are employed. Whether or not the brown color is obtained depends a great deal on circumstances. For it is a fact that quite a few shades will be obtained by a combination of these three colors in addition to the brown. For this reason the dyer is not always sure beforehand that he will obtain the desired color.

It is, of course, possible to make use of the color circle in determining the shade that will be obtained by mixing together the individual colors, and it is possible to determine just in what proportions the mixture must be made in order to secure the desired result. But even if it has been established in this manner that five parts of red, three parts of yellow and two parts of blue, for example, will give the color tone, nevertheless not very much information has been obtained. When a color liquor is made up in these proportions, it is still not certain that the various dyes will all be absorbed by the fiber in the same manner and the same degree.

In spite of the fact that the color bath is prepared in the ratios of 5:3:2, it is altogether possible that the ratios on the fiber will be 2:4:1. However, if the coloring matters composing the liquor all have the same affinity for the fiber, then it may be assumed with some certainty that they will be found on the fiber distributed in the same ratios as in the color bath. This, however, is by no means true in all cases.

For example, a reddish brown is obtained from Fast Red A, Fast Yellow and Patent Blue V on wool. If the mechanism of the dyeing process is examined, it will be seen that in the first period the largest portion of the red with only small amounts of the yellow and blue are absorbed by the fiber. As the dyeing proceeds practically all of the red dye is completely absorbed and the color of the dye liquor which was first brown now becomes olive and then green. Toward the end of the dyeing the greatest part of the yellow is absorbed and the bath then becomes almost a pure blue. This observation teaches that the behavior of the different dyestuffs toward the fiber in a single color bath is quite a varied one.

It always happens that the color that has the greatest affinity for the fiber is absorbed first and thereafter those that have lesser affinities. The color with the greatest affinity is also absorbed most quickly and most completely. From this a rule may be derived which states that the greater the affinity of the color the less of it should be used in making up the composite color liquor. In the above example it is essential that less of the Fast Red be employed and more of the Fast Yellow and the Patent Blue. Furthermore, there must also be a very definite ratio between the yellow and the blue in order to obtain the proper shade of brown. (Deutsche Faerber Zeitung, 1926, page 383.

NEW ALIZARINE DYESTUFF PRODUCED IN GERMANY

The Bayer plant of the I. G. Farbenindustrie has developed a new alizarine for woolen materials called "Alizarine Astrol Violet B patented." It is generally applied with an acid bath; aftertreatment can also be applied with chromium salts without dulling the shades of the material. The new dye is chiefly used for woolens, and carpet yarns as well as for decorative and furniture materials.

MEETING OF THE GERMAN DYE TRUST

The I. G. Farbenindustrie A. G. held its annual meeting on June 10 at Frankfort. It was attended by 187 common shareholders representing 444,358,600 marks (of a total common share capital of 641.5 millions) and one preferred shareholder representing a total of 4.4 millions.

The meeting approved the 10 per cent dividend as proposed in the annual statement which was issued May 20, 1926.

BRITISH DYESTUFF CORPORATION DECLARES A DIVIDEND

According to a public announcement on June 24, the directors of the British Dyestuffs Corporation declared a dividend of 2½ per cent on the ordinary capital for the year ended March 31. This is the first dividend to be declared on the reorganized capital since the reconstruction scheme brought forward last November. Under the scheme, which involved the termination of Government control and a drastic writing down of the assets, the previous capital of £9,197,112 in preference, preferred, and deferred shades was replaced by £4,775,580 in ordinary shares.

EDWARD V. PETERS ELECTED VICE-PRESIDENT OF TUBIZE

Reaching heights of endeavor in one industry, Edward Volney Peters, newly elected vice-president and director of the Tubize Artificial Silk Company of America, is beginning anew in another. For twenty years, as an executive of the New Jersey Zinc Company, his medium has been acids, metals, pigments, chemicals and paints, which he now has abandoned for the new and possibly greater prospects of artificial silk.

But he explains that his business success is founded on the organization and reorganization of markets and he believes that the marketing of textiles is not greatly dissimilar from the marketing of paints, oils and varnishes. That is to be Mr. Peters' function with the Tubize Company, the creation of markets and of sales organizations to develop them.

INCREASE IN DYE IMPORTS OF NANKING, CHINA

An increase of $5,765 was registered in the import of aniline dyes through Nanking during the first quarter of 1926, as compared to the corresponding period of 1925. The import values of the two periods were $11,205 and $5,540 respectively. The growth in consumption was due principally to the increasing demand of the cotton industry in the vicinity of Nanking.

LOGWOOD INDUSTRY IN HAITI

The only logwood extract factory in Haiti is now being dismantled. In 1924, this plant shipped 1,035,968 pounds of extract and 60,477 pounds of crystal to the United States and in 1925 increased the extract shipments to 2,691,460, the export of crystals fell off to 44,400 pounds.

A forest reserve has been set aside between St. Raphael, Pignon and Dondon. This reserve, to be known as "The National Forest of St. Raphael," embodies a logwood area of some 100,000 acres.

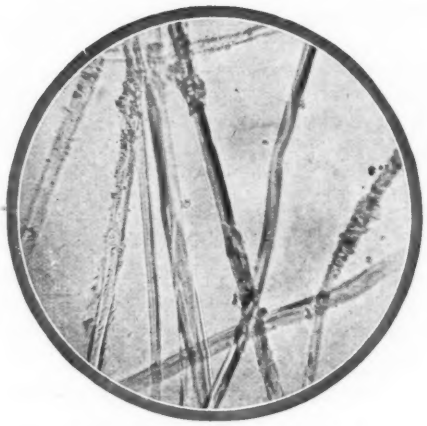
The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

SITUATION WANTED

Worsted dyer, 26 years of age, desires position. Graduate of Textile School and five years of mill experience; also laboratory experience. Excellent references gladly given. Address Box 347, American Dyestuff Reporter.

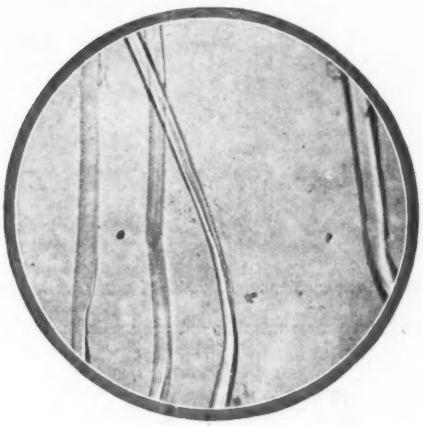
EXPERIENCED CHEMIST AVAILABLE

Chemist, thirty-five years of age, fifteen years' dyestuff experience, two years' experience boss dyer and chemist in cotton piece goods, desires permanent connection. Thoroughly competent colorist on all types of dyestuffs on cotton and some experience on silk mixtures. Box 348, American Dyestuff Reporter.



The photomicrograph above shows a faulty spot in silk that has been degummed in water containing a small amount of impurity. Note the deposits that cling to the fibres.

The photomicrograph below shows how clean the fibres are when degummed in properly conditioned water. Clean fibres like these will make quality products.



It Pays to Study Your Water Supply

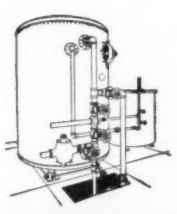
IN the various processes throughout your mill, water is probably by far the biggest raw material you use—have you ever examined it for impurities and for quality, as you examine other raw materials? It certainly would pay you to do so.

Look closely at the two photomicrographs above. On the right are clean silk fibres that were degummed in Permutit softened water—examine the almost transparent fibres and note how clean they are. Then look at the other photomicrograph of similar fibres degummed in water containing a few grains of hardness per gallon, and see how the lime soap curds formed by hardness almost bury some of them. When such fibres are dyed and finished the product is necessarily of inferior quality, and very likely to be spotty, lusterless and altogether unsatisfactory.

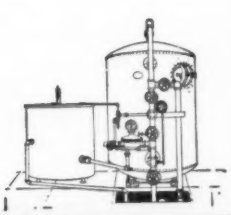
The mill that sent us these two samples saved thousands of dollars by installing Permutit apparatus to properly condition their water supply. They cut down re-dyes to an almost negligible amount, and their rejections scarcely amount to anything now, although they used to cost a lot of money. In addition, the quantity of soap and supplies saved paid for the entire Permutit installation in about 18 months.

We are specialists in solving water problems. We make all types of apparatus for conditioning water, and our equipment is saving thousands of dollars annually for many textile mills by eliminating troubles and improving the quality of yarns and cloth.

Our booklet, "Reducing Textile Costs and Troubles," contains a lot of valuable information about textile water supplies. Let us send you a free copy. Write today—The Permutit Company, 440 Fourth Ave., New York.



Permutit
water softeners
Take all the hardness out of water



The PERMUTIT COMPANY - 440 Fourth Avenue - NEW YORK

Carbic Color & Chemical Company, Inc.

INDIGOSOL O **INDIGOSOL O4B**

Aniline Colors—Chemicals

451-453 WASHINGTON STREET **NEW YORK CITY**

Branch Offices: Philadelphia, Providence, Boston
SOLE AGENTS FOR DURAND & HUGUENIN S.A., PASLE, SWITZERLAND

ANTHRAPOLE OIL

UNEXCELLED FOR WOOL AND WORSTED PIECE DYEING

REMOVES OIL SPOTS AND LIME SOAPS

ELIMINATES THE CAUSE OF STREAKY PIECES, ASSURING LEVEL DYEINGS

ARKANSAS COMPANY

INCORPORATED

233 BROADWAY NEW YORK

Your General Store—

IN the general store of the dyeing industry goods are both bought and sold. It is the market where buyers come for used machinery—dyeing machinery, extractors, washers, bleaching kiers, mercerizing machines, surplus chemicals, dyehouse supplies. Those who have such goods to sell find it *profitable* to dispose of them here.

The general store is the classified advertising columns of the journals of the industry.

The American Dyestuff Reporter maintains a branch of this general store. *Its classified column is for you,* if you have machinery or chemicals to sell.

You will find that even an inch space is very *profitable* in this market. Try it.

American Dyestuff Reporter
90 William Street New York City

HOWES PUBLISHING CO.,
90 William Street, New York.

.....192...

Please enter my subscription for the American Dyestuff Reporter for one year from date, for which you may bill me $5.00.

.....

.....

Canadian Postage $5.50: Foreign $6.00.

.....

DIAX

Bleachers, Finishers and Dyers have complained that de-sizing compounds were expensive and hard to handle.

DIAX, made by the MALT-DIA-STASE CO., brought down the price and made its use easy.

DIAX, because it is better, is being used with great success by the largest Bleachers, Finishers, Printers and Dyers

Write us for Free Demonstration and Sample

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Wyckoff Avenue and Decatur Street Evergreen, N. Y.

United States Color & Chemical Company, Inc.

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New York Office: 25 Howard St.

FACTORY:

NEW ENGLAND ANILINE WORKS, Inc.

Ashland, Mass.

1816 CHEMICALS *1926*

"Over a Century of Service and Progress"

BLEACHING POWDER

FINISHING MATERIALS

FORMIC ACID

COLORS

GUMS and WAXES

DYESTUFFS CAUSTIC SODA

INNIS, SPEIDEN & CO.

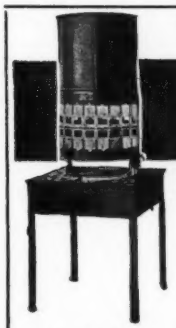
Manufacturers, Importers, Exporters of Industrial Chemicals

46 Cliff Street New York

BRANCHES:

Chicago Philadelphia Boston Cleveland

Gloversville, N. Y.



Will it Fade? Ask the

FADE-OMETER

Standardized Sunlight

Sticking Your Head in the Sand

is all right for an ostrich. But the successful dyehouse doesn't fool itself by "sticking its head in the sand" in the matter of fastness to light of its product. It employs 24-hours-a-day standardized sunlight (the Fade-Ometer) and makes an actual test of every dyeing.

No guesswork. No hoping that the goods will "get by." With your shipments tagged "Fade-Ometer Tested" you can rest easy that there will be no rejections, no adjustments, no unjust claims. Yes, indeed, the FADE-OMETER is YOUR protection.

Atlas Electric Devices Co.

364 W. Superior St. Chicago, Illinois

New York
F. Schlayer
25 Howard Street

London
Kelvin Bottomley & Baird, Ltd.
51/52 Fenchurch St., E. C. 3

Boston: S. R. David & Co., 252 Congress Street

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Onyx Oil & Chemical Co.

Oils, Chemicals, Gums and Finishes

for the

THROWSTER, DYER, FINISHER AND PRINTER

Headquarters for

SANITOSE
Reg. U. S. Pat. Off.
A superior silk finish

SILTEX GUM
Reg. U. S. Pat. Off.
The new printing gum

DECERESENE
Reg. U. S. Pat. Off.
The chemical degummer

Office and Works: **Jersey City, N. J.**

Our Laboratory at your service.

Dyes That Excel

Linked with

Service That Excels

A steadily increasing number of master dyers are finding it distinctly desirable to specify EXL DYES.

The first order verifies our claims for uniformity and dependability.

Repeat orders follow as a result of the genuine satisfaction with which EXL Dyes and EXL service give.

Let us demonstrate our capacity to give you similarly satisfactory service.

UNITED ANILINE COMPANY

DYESTUFFS, CHEMICALS, OILS AND SOAPS

120 HIGH STREET BOSTON, MASS.

"EXL DYES EXL"

Banish "Fog"

The Destroyer of Your Dyehouse

"FOG" is the chief cause of rapid deterioration of a raw stock dyehouse; it rusts or corrodes metal, rots wood and loosens brickwork. Banish this insidious enemy. The Franklin Process Raw Wool Dyeing Machine will do it. It dyes under pressure *in a closed kier.*

In retarding the deterioration of your dyehouse, this machine also increases the efficiency of labor, makes an important saving in fuel and a tremendous increase in production. In one instance one operator, with two helpers for loading and unloading only, runs five Franklin Process machines, with a production of 5,000 pounds of chrome colors per day. Another owner reports that he is stripping 6,000 pounds of rags per day in one machine. The Franklin Process machine does not disturb the stock, as the flow of liquor is entirely in one direction. The stock therefore is in the best possible condition after dyeing, reducing waste to a minimum. The pressure method effects thorough penetration and insures even shades. This machine can also be operated at a temperature 25 to 30 degrees lower than required for open kier dyeing. This means a stronger fibre and a better yarn.

The complete story is told in our booklet entitled "AN IDEA — and What Came Of It." A copy will be forwarded to you, on request, without obligation.

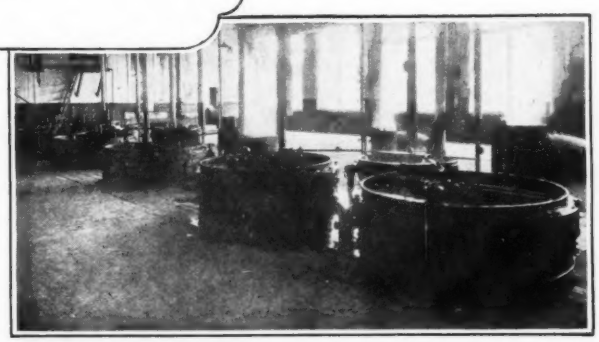
Several mills tell in this booklet, their experience with Franklin Process Raw Stock Dyeing Machines.

It's an exceptionally interesting story. A copy will be mailed to you, on request, free of all obligations.

FRANKLIN PROCESS COMPANY

Manufacturers of Dyeing Machines, also Yarn Dyers and Manufacturers of Glazed Yarns

PROVIDENCE, RHODE ISLAND



The illustration on the left shows a battery of Franklin Process Raw Stock Dyeing Machines in operation in a well known New England mill. Note the absence of dyehouse fog.

THE NEWPORT COLORS

New Product

First American Production

Anthrene Violet RN

Distinguished by its level dyeing, fastness and non-spotting properties.

Stocks immediately available

Newport Chemical Works, Inc.

Passaic, New Jersey

BRANCH OFFICES AND WAREHOUSES:
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